December 3, 2012

Regional Administrator
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Attn: Michelle Kerr

Director, Remediation
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Minnesota Pollution Control Agency
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St. Paul, Minnesota 55155
Attn: Nile Fellows

John Jones
Vertellus Specialties, Inc.
201 North Illinois Street, Suite 1800
Indianapolis, Indiana 46204

**Subject: United States of America, et al. vs. Reilly Tar & Chemical Corporation, et al.**
**File No. Civ. 4-80-469 CD-RAP Section 3.3**

Dear Project Leaders,

The City of St. Louis Park has prepared the attached "Revised Annual Monitoring Report for 2011" in accordance with the October 1, 2012 letter from U.S. EPA and MPCA. This revised report contains three new attachments that provide supplemental information. Future annual monitoring reports will contain a disk of all laboratory reports for the given year, as requested. The 2011 laboratory reports, which were appended to the original March 15, 2012 submittal, were not repeated in the enclosed document because there were no modifications to them.

You may direct any questions or comments to this office.

Sincerely,

William M. Gregg

William M. Gregg
Project Leader for the City of St. Louis Park

cc: Scott Anderson, City of St. Louis Park

# REVISED ANNUAL MONITORING REPORT
# FOR 2011

**SUBMITTED TO THE**

**REGIONAL ADMINISTRATOR**
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION V**

**EXECUTIVE DIRECTOR**
**MINNESOTA POLLUTION CONTROL AGENCY**

**BY**

**THE CITY OF ST. LOUIS PARK, MINNESOTA**

**PURSUANT TO**
**CONSENT DECREE - REMEDIAL ACTION PLAN**
**SECTION 3.4**

**UNITED STATES OF AMERICA, ET AL.**

**vs.**

**REILLY TAR & CHEMICAL CORPORATION, ET AL.**

**UNITED STATES DISTRICT COURT**
**DISTRICT OF MINNESOTA**
**CIVIL NO. 4-80-469**

**December 3, 2011**

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**APPENDICES**

Please refer to the Guide to Appended Laboratory Results for all 2011 samples. This guide precedes the Appendices.

**ATTACHMENTS**

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# 1.0 INTRODUCTION

Pursuant to Section 3.4 of the Consent Decree - Remedial Action Plan (CD-RAP) in the case of the United States of America, *et al.* vs. Reilly Tar & Chemical Corporation, *et al.*, this report presents the results of all chemical analyses and water level measurements for calendar year 2011 that are not presented in previous reports.

The ground water monitoring conducted in 2011 was performed in accordance with the methods and procedures identified in the 2011 Sampling Plan. The City of St. Louis Park (City) has overall responsibility for conducting the ground water monitoring required by the CD-RAP. In accordance with the 2011 Sampling Plan, AECOM, Inc. (AECOM) collected ground water samples from monitoring wells. TestAmerica Laboratories, Inc. (TA) and Pace Analytical Services (Pace) performed the analyses for PAH. Summit Envirosolutions, Inc. (Summit) assisted with various reporting and data validation tasks.

The 2011 monitoring data are presented separately for each aquifer, starting with the Mt. Simon-Hinckley Aquifer, which is the deepest aquifer below the ground surface, and ending with the Drift Aquifer, which is the uppermost aquifer monitored. A series of maps has been prepared to help present the monitoring data. Maps for the Prairie du Chien-Jordan, St. Peter, Platteville, and Drift Aquifers are contained in this report.

A series of tables has been prepared for each aquifer to help present the analytical results since 1988. These tables illustrate trends in PAH concentrations in the ground water for each monitoring well. The shaded tables represent wells that are no longer monitored as part of the Sampling Plan, were not scheduled to be sampled, or wells that were unavailable for sampling during the scheduled time. Graphs of the PAH concentrations are shown in Attachment A.

A laboratory data review was conducted to assess the quality of the laboratory data. The data quality assessment (DQA) can be found in Section 9.0 of this report. Additionally, a total of four of the data packages (two from each laboratory) underwent full data validation. Each appendix includes a laboratory data package for a set of samples collected and submitted for analysis at the same time. Attached to the end of selected data packages are DQA reports summarizing the quality of the analytical data contained in each package. The data Appendices are organized chronologically throughout the year, as shown in the Guide to Appended Laboratory Results immediately preceding the Appendices.

# 2.0 MT. SIMON-HINCKLEY AQUIFER

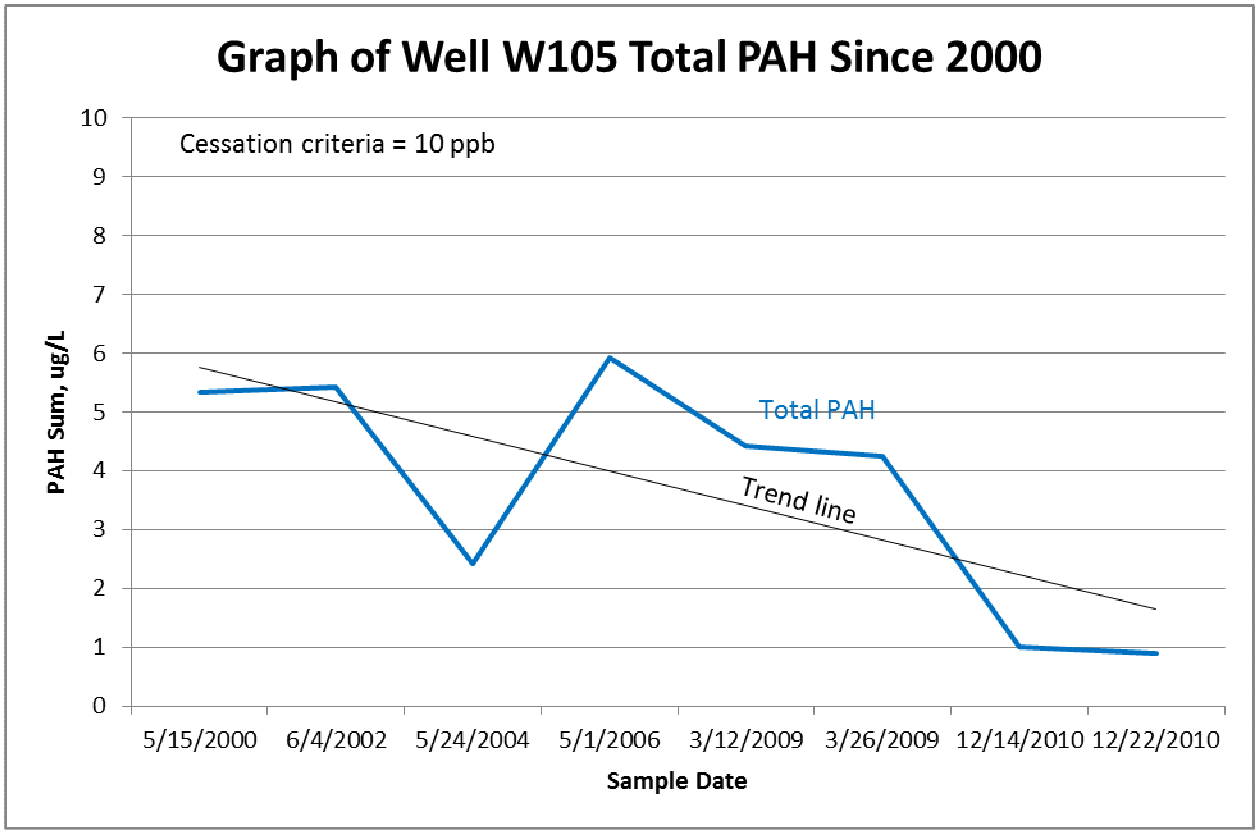
St. Louis Park municipal water supply wells SLP11 and SLP12 were sampled once in 2011. Well SLP13 was out of operation due to maintenance for the year and well SLP 17 has not been used since 2000 and was not available for sampling due to damaged pump and controls. Neither the City nor the Minnesota Department of Health (MDH) issued permits for any new Mt. Simon-Hinckley Aquifer wells within the boundaries of the City of St. Louis Park (encompassing greater than a one mile radius around well W23 as specified in Section 5.3.2 of the CD-RAP) in 2011. The 2011 analytical data for the Mt. Simon-Hinckley wells are shown on Figure 1. The laboratory reports of the analytical data are included in the Appendices. The Guide to Appended Laboratory Results for all of 2011 precedes the Appendices.

The advisory levels for the sum of benzo(a)pyrene and dibenz(a,h)anthracene, carcinogenic PAH, and Other PAH are 3, 15 and 175 nanograms/liter (ng/l or parts per trillion), respectively. Table 1 lists the historical results since 1988 of other PAH and carcinogenic PAH data collected from the three wells that are still in service. Well SLP17 has been out of service since 2000 and has not been sampled since then. The 2011 data indicate that the sums of the concentrations of benzo(a)pyrene and dibenz(a,h)anthracene, carcinogenic PAH, and other PAH in wells SLP11 and SLP12 were below the advisory levels for these compounds. It appears that the Mt. Simon-Hinckley Aquifer has not been significantly affected by contaminants originating from the former Reilly Tar & Chemical Corporation (Reilly) site.

## 3.0 IRONTON-GALESVILLE AQUIFER

Analytical results from ground water samples collected during 1988 through 1991 from well W105 had consistently met the criterion (less than 10 parts per billion [ppb] total PAH) for discontinuing the 25 gallons per minute (gpm) pumping rate. Therefore, in accordance with CD-RAP Section 6.1.5, the pump in well W105 was inactivated on December 23, 1991, and remains inactivated. Neither the City nor the MDH issued permits for any new Ironton-Galesville Aquifer wells within the boundaries of the City of St. Louis Park (encompassing greater than a one mile radius around well W23 as specified in Section 6.2.1 of the CD-RAP) in 2011.

The historical analytical results for well W105 from 1988 through 2010 are presented on Table 2 and are shown graphically in Attachment A, page 20. PAH concentrations exceeded the 10ppb cessation criteria in 2008 and 2010 due to purging problems with the original sample. Confirmation sampling conducted indicated concentrations that were consistent with previous years. Apparently the concentration of PAH in samples from well W105 are related to purging time. This is likely due to PAH sorbed to the permanent pump, drop pipe, and casing installed in the well. Without the two samples that were collected with insufficient purging, the total PAH concentrations in well W105 have been trending downward over the last 10 years (see chart below). W105 will next be sampled in 2012.



# 4.0 PRAIRIE DU CHIEN-JORDAN AQUIFER

Prairie du Chien-Jordan Aquifer wells were monitored in accordance with the 2011 Sampling Plan. However, some wells listed in the sampling plan (because they are identified in the CD-RAP) were not available for one or more sampling events in 2011. These wells included:

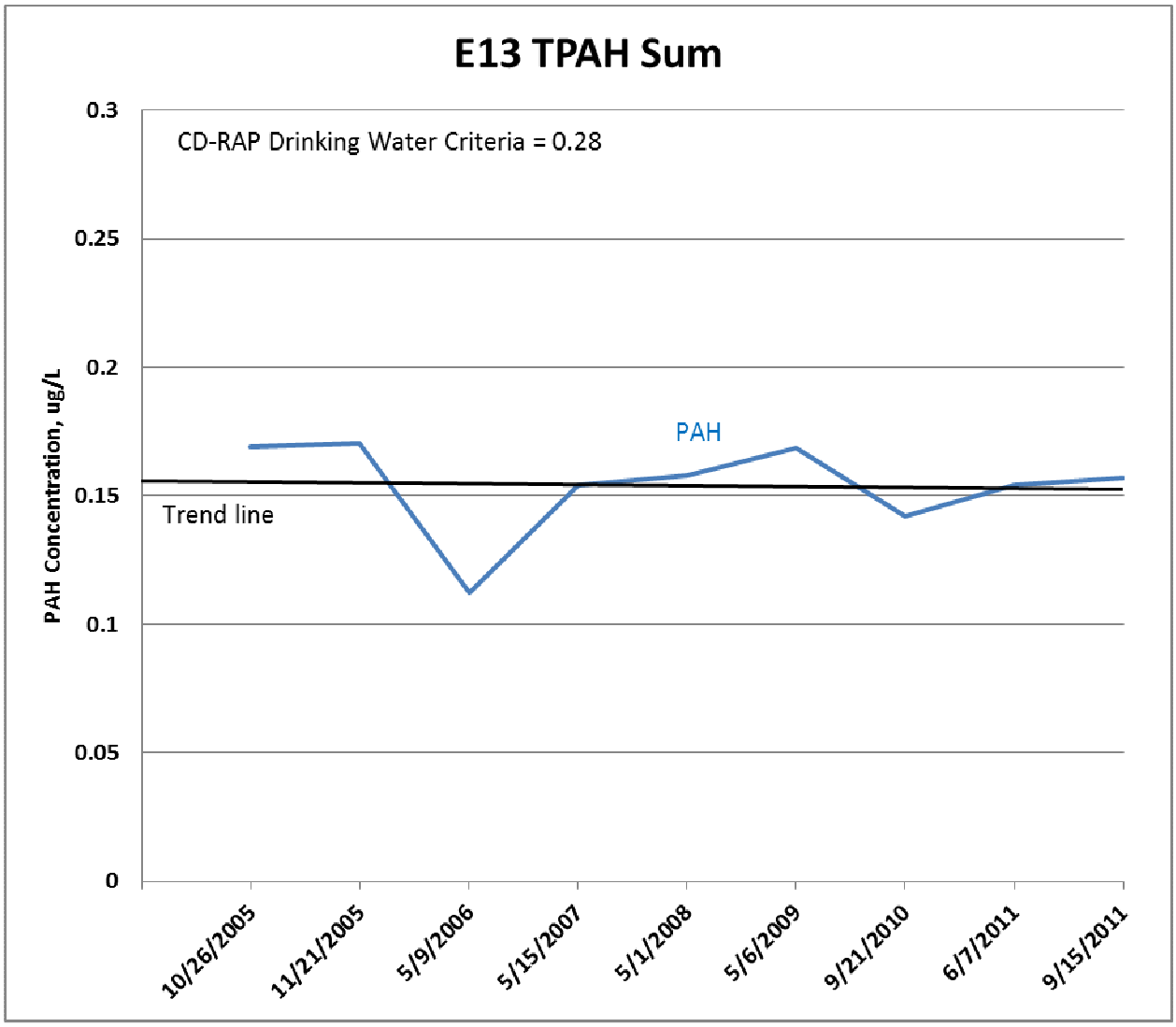
- W29 was due to be sampled once in 2011. Flame Industries vacated the property and the well was not operational for the year.
- W40 and W70 were due to be sampled once in 2011. These two Prairie du Chien-Jordan Aquifer industrial wells have been abandoned in prior years.
- E7 was due to be sampled once in 2011. The City of Edina is not using this well pending completion of a VOC treatment facility, and did not provide access to the well for PAH sampling.
- SLP 6 was due to be sampled quarterly in 2011. It was sampled in the first three quarters of the year, but was unavailable for sampling in the fourth quarter due to maintenance.
- W119 was due to be sampled quarterly in 2011 but was only available for sampling in the second and third quarters. During the off season, the golf course winterizes the well and did not provide access.

An annual sample is collected from Well SLP10 or SLP15. In 2011, a sample was collected from SLP10. Wells SLP14, SLP16, and W405 or W406 are required to be sampled every other year. The recent sampling schedule has these wells sampled on even-numbered years (e.g., 2012, 2014, and 2016). Samples were collected from these wells in 2010; therefore, these wells will be sampled again in 2012.

In addition to water quality monitoring, ground water elevations were recorded at most municipal Prairie du Chien-Jordan Aquifer wells that are equipped with pressure transducers. A total of 13 wells were used to collect ground water samples during 2011. Water level data are provided in Attachment B. The laboratory reports of the analytical data are included in the Appendices. The Guide to Appended Laboratory Results for all of 2011 precedes the Appendices.

Summaries of analytical data are shown in Figures 2 and 3, and Figure 2 includes groundwater elevation contours. The direction of ground water flow in the Prairie du Chien-Jordan Aquifer is strongly affected by pumping wells. Municipal wells in St. Louis Park and surrounding cities pump at greater than 1,000 gpm and have a considerable effect on localized ground water flow. However, these wells systematically turn on and turn off; therefore, the general ground water flow is affected by which wells are pumping and at what rates. According to several literature resources, including the USGS (Water Supply Paper 2211, 1984), Norvitch and others (Water Resources Outlook of the Minneapolis and St. Paul Metropolitan Area, 1973), the general ground water flow in the Prairie du Chien-Jordan Aquifer is toward the east.

Table 3 presents a historical summary of analytical results from 1988 through 2011 for Prairie du Chien-Jordan Aquifer wells. Graphs showing the total PAH concentrations are included in Attachment A. St. Louis Park wells SLP10 and SLP4 continue to show decreasing concentrations of PAH. Water quality results for the 2011 samples from well SLP4 meet the CD-RAP drinking water criteria without GAC treatment. In fact, SLP4 has met the CD-RAP drinking water criteria since 2002 (see Attachment A page 65). However, the City continues to treat the water from well SLP4. Groundwater samples from Edina municipal wells E2, E3 and E15 continue to indicate stable concentrations of PAH (Attachment A pp. 76, 77, and 80). Edina well E13 samples have shown an increasing trend in PAH concentrations since 1996 (Attachment A, p. 79). Well E13 PAH results appear to have stabilized below the CD-RAP drinking water criteria in the past few years, as shown in the chart below.



The CD-RAP relies on pumping wells to control the gradients and groundwater flow directions in the Prairie du Chien-Jordan Aquifer. The effectiveness of the gradient control system in the Prairie du Chien-Jordan Aquifer can be evaluated by examining the analytical data on the extent and magnitude of PAH in the aquifer. The water quality data in the Prairie du Chien-Jordan Aquifer indicate that concentrations of PAH exceeding the CD-RAP drinking water standards have not migrated to new areas such as Edina. The only samples collected in 2011 that exceeded the CD-RAP drinking water criteria were collected from well W23 on site, SLP10 northeast of the site, and well W403 located approximately two miles east of the site. The PAH in well W403 is likely related to foreign materials in the well as explained below. A depiction of the inferred area of the Prairie du Chien-Jordan Aquifer containing PAH in concentrations above the CD-RAP drinking water criteria is shown in Figures 2 and 3. The inferred areas shown in Figures 2 and 3 were based on 2011 analytical results coupled with historical data from all of the wells including wells W70 and W40 which are abandoned and no longer monitored.

The effectiveness of the constant pumping of wells SLP10 (or SLP15) and SLP4 is further highlighted by historical water quality results in well W48. Well W48 has shown a pattern of increased PAH concentrations when pumping compared to non-pumping conditions. Well W48 PAH concentrations are shown on page 17 of Attachment A. In the late 1980s when well W48 pumped at a higher rate and was used for once-through cooling water at the hospital, PAH concentrations were greater than one part per billion. After pumping was limited to irrigation use only, the PAH concentrations dropped and have remained below one part per billion. This pattern demonstrates that the well is located on the southern margin of the area of the Prairie du Chien-Jordan Aquifer containing PAH in concentrations above the CD-RAP drinking water criteria.

An estimate of the capture area of well SLP4 could be calculated using average hydrogeologic parameters of the Prairie du Chien-Jordan Aquifer and assuming these aquifer attributes in three dimensions. Using the formula Q=kiA (well discharge or pumping rate equals the product of hydraulic conductivity, hydraulic gradient, and cross-sectional area of flow to the well), the estimated capture area of well SLP4 is nearly 2 miles wide using a pumping rate of 985 gallons per minute (the 2011 average pumping rate), a hydraulic conductivity of 42 ft/day (Metro Model mean), a gradient of 0.002 (USGS, WRI Report 85-4087) and an aquifer thickness of 216 feet (STS, 2006).

The sums of the concentrations of benzo(a)pyrene and dibenz(a,h)anthracene and carcinogenic PAH were below the drinking water criteria in all of the Prairie du Chien-Jordan Aquifer municipal supply wells during 2011. However, an anomalous result was obtained from the extended analysis performed by Test America on the September 13, 2011 sample from well SLP10 after carbon treatment (SLP10T). The extended analysis reported a total of 62.8 ng/l of carcinogenic PAH which is higher than the drinking water criteria and higher than the results for contemporaneous samples collected from well SLP10 before and after carbon treatment (analyzed for 31 PAH

compounds). The data report for this analysis is provided in Appendix I. None of the “extra” compounds on the extended list contributed to the elevated CPAH total. Also, the split sample sent to Pace laboratory which was analyzed for 25 CPAH did not detect any CPAH (Appendix J). Additional treated water samples were collected in accordance with CD-RAP Section 4.3.2. The reanalysis (Appendixes L and M) showed that no CPAH were detected, although relatively high levels of Other PAH were detected in the blanks. As a result of these tests, the carbon is due to be replaced in 2012 in accordance with the normal replacement schedule.

Overall, the graphs in Attachment A show that the amount and distribution of PAH in the aquifer in 2011 was consistent with historical patterns and continues to show a stable or decreasing trend of PAH concentrations in 18 of the 23 wells. Prairie du Chien – Jordan Aquifer wells graphed in Attachment A include the following wells (page number):

| | | |
|---|---|---|
| W23 (p. 10) | W119 (p. 22) | SLP wells (pp. 65 to 75) |
| W29 (p. 13) | W401 (p. 34) | Edina wells (pp. 76 to 80) |
| W40 (p. 16) | W402 (p. 35) | Hopkins well H6 (p. 81) |
| W48 (p. 17) | W403 (p. 36) | MTKA6 (p. 82) |
| W70 (p. 18) | W406 (p. 37) | |

Of the 23 Prairie du Chien – Jordan Aquifer graphs shown in Attachment A, increasing trends are shown for wells W403, SLP6, E7, E13, and H6. During low-flow sampling in 2011 an obstruction was encountered in well W403 at a depth of approximately 240 feet. On October 4, 2012 this well was inspected with a down-hole television camera and was shown to contain debris including branches, wood, grass, and soil. The City is of the opinion that these materials likely affected PAH concentrations in samples from the well. The City is in the process of cleaning this well to remove the debris.

# 5.0 ST. PETER AQUIFER

Eleven St. Peter Aquifer wells were monitored in 2011 in accordance with the 2011 Sampling Plan. In addition to water quality monitoring, ground water elevations were measured in St. Peter Aquifer wells throughout the year. Summaries of analytical data and ground water elevations are shown in Figure 4. Laboratory reports of the analytical data are included in the Appendices. The Guide to Appended Laboratory Results for all of 2011 precedes the Appendices. Table 4 presents a historical summary of analytical results from 1988 through 2011 for St. Peter Aquifer wells (graphs are in Attachment A).

The groundwater contours in Figure 4 are illustrated using the water level data measured during sampling. Figure 4 also shows the estimated hypothetical capture area of well W410 as calculated from the formula Q=kiA (well discharge or pumping rate equals the product of hydraulic conductivity, hydraulic gradient, and cross-sectional area of flow to the well). The estimated capture area of well W421 is nearly 4000 feet wide using a pumping rate of 53 gallons per minute (2011 average pumping rate), a hydraulic conductivity of 13 ft/day (Metro Model mean), a gradient of 0.002 (USGS, WRI Report 90-4150) and an aquifer thickness of 100 feet (see well log for W23, USGS WSP 2211). The capture zone can also be inferred by the shape of the water elevation contours, and it extends over a relatively large portion of the study area. The uniformity of hydrogeologic characteristics of the St. Peter Aquifer tends to decrease the uncertainty of the estimated capture zone calculations and/or graphical solutions. However, some uncertainty exists due to the assumptions used concerning a uniform gradient and transmissivity of the aquifer.

With the notable exception of wells W409 and W410, PAH concentration trends at individual wells have been steady or decreasing both inside and outside the well W410 capture area (see graphs in Attachment A). Pumping at well W410 has clearly drawn higher concentrations of PAH into the well from source areas closer to the Reilly Site. Well W409 is located relatively close to the Reilly Site and PAH concentrations were initially relatively low in well W409, but increased after Well W410 began pumping in 1991 to a high in 2000 and the PAH concentrations have been decreasing since then. Pumping well W410 has apparently caused relatively high concentrations of PAH that were close to the Reilly Site to migrate downgradient into the pumping well, where concentrations continue to increase. Therefore, well W410 has had mixed effectiveness in controlling PAH: on one hand the relatively high PAH concentrations have not been found downgradient of the pumping well, but on the other hand the PAH have been spread farther downgradient from the Reilly Site.

No groundwater samples from the St. Peter Aquifer contained PAH concentrations above MDH HRLs/HBVs. The inferred area of the St. Peter Aquifer that exceeds CD-RAP drinking water

criteria is shown in Figure 4. Wells W14, W129, W409, and W410 exceeded the CD-RAP drinking water criteria in 2011. There are no known drinking water wells or other receptors downgradient from the areas containing PAH shown on Figure 4.

Pumping well W410 does not have any influence or hydraulic control on well W122 because well W122 is completed in the basal St. Peter Formation and is separated from the well W410 pumping stress by shale confining layers. Attachment C contains well logs for W410 and W122. The water quality in well W122 is not expected to change in response to pumping conditions at well W410 and PAH concentrations will remain close to the CD-RAP drinking water criteria. One sample from 2009, one sample from 2010, and many previous well W122 samples have exceeded the CD-RAP drinking water criteria. The 2011 sample from well W122 contained relatively little PAH.

# 6.0 PLATTEVILLE AQUIFER

In accordance with the 2011 Sampling Plan, 19 samples were collected from 16 Platteville Aquifer monitoring wells (including quarterly samples from well W421) in 2011. A second sample from well W22 was inadvertently omitted. In addition to water quality monitoring, ground water elevations were measured in Platteville Aquifer wells on the sampling dates (Attachment B). Summaries of analytical data and ground water elevations for 2011 are shown in Figure 5. Laboratory reports of the analytical data are included in the Appendices. The Guide to Appended Laboratory Results for all of 2011 precedes the Appendices.

Table 5 is a historical summary of analytical results since 1988 for Platteville Aquifer wells. The analytical results for all Platteville Aquifer wells are reported in micrograms per liter (ug/l), or parts per billion. The historical water quality data shown in Table 5 indicates a steady or decreasing trend of PAH concentrations in the Platteville Aquifer wells that were sampled in 2011 (also see graphs in Attachment A). However, the pumping of well W421 has drawn DNAPL into that well and the samples contain higher and more variable PAH concentrations as a result. Only wells W421 and W437 provided samples that contained PAH concentrations above the MDH HRLs/HBVs. The inferred areas where Platteville Aquifer groundwater exceeds the MDH and CD-RAP criteria, as based on current and historical analytical results, are shown in Figure 5.

Well W421 pumped at an average rate of 31 gpm in 2011. Figure 6 shows the estimated capture area of well W421 as derived from a calculation using the formula Q=kiA (well discharge or pumping rate equals the product of hydraulic conductivity, hydraulic gradient, and cross-sectional area of flow to the well). The estimated capture area of well W421 is approximately 800 feet wide using a pumping rate of 31 gallons per minute, a hydraulic conductivity of 187 ft/day (calculated from the well W421 aquifer test in 1988), a gradient of 0.002 (average of the gradients shown on Figure 5 for wells W20/W130 (i=0.004) and wells W434/W131 (i=0.001) and matching the gradients in the Drift Aquifer above that is hydraulically connected) and an aquifer thickness of 20 feet (see well log for W27, USGS WSP 2211).

The simplifying assumptions required for this calculation are not well matched to the anisotropic characteristics of the Platteville Aquifer. For example, a recent study calculated hydraulic conductivities of six Platteville wells ranging between 300 ft/day and 47,000 ft/day ("Hydrostratigraphy of a fractured, urban aquitard", Anderson, Runkel, and Tipping of the MGS. GSA Field Guide 24, GSA Annual Meeting, October 13, 2011). Even the aquifer thickness is debatable due to the degree of hydraulic connection between the Drift and Platteville Aquifers, which would tend to increase the effective aquifer thickness, and due to the secondary porosity in the Platteville Limestone which may provide significant flow pathways through relatively small bedding plane solution features. Thus the estimated capture area is subject to considerable professional judgment. The well W421 capture area is located in the middle of the bog area where

DNAPL is present and the largest source of PAH is believed to exist. As depicted in Figure 5, well W421 appears to be hydraulically controlling most of the bog area as required by the CD-RAP.

# 7.0 DRIFT AQUIFER

In accordance with the 2011 Sampling Plan, 19 samples were collected from 11 Drift Aquifer monitoring wells (including pumping wells) in 2011. Well W7 was not sampled because it was abandoned prior to 1983 by others and well W422 was inadvertently omitted from 2011 sampling. In addition to water quality monitoring, ground water elevations were measured in the Drift Aquifer wells on the sampling dates (Attachment B). Summaries of 2011 analytical data and ground water elevations are shown in Figure 6. The water level contours illustrated in Figure 6 illustrates the regional east-southeast ground water flow direction (USGS WSP 2211).

Table 6 is a summary of analytical results since 1988 of Other PAH, carcinogenic PAH, and phenolic data for the Drift Aquifer wells. The 2011 analytical results for all Drift Aquifer wells are reported in micrograms per liter (ug/l), or parts per billion. The historical water quality data shown in Table 6 and the graphs in Attachment A indicate a decreasing trend in PAH concentrations in most Drift Aquifer wells that were sampled in 2011 (well W9 increased in 2012). During the many years of groundwater monitoring at the Reilly Site, only wells W420 and W439 routinely provided samples that contained PAH concentrations above the MDH HRLs/HBVs. The inferred areas where Drift Aquifer groundwater exceeds the MDH and CD-RAP criteria, as based on current and historical analytical results, are shown in Figure 6.

The average pumping rates for wells W420 and W439 were 40 and 58 gpm, respectively in 2011. A calculation of the theoretical width of the capture area can be made based on Q=kiA (well discharge or pumping rate equals the product of hydraulic conductivity, hydraulic gradient, and cross-sectional area of flow to the well). Of these parameters, the hydraulic conductivity and its distribution in three dimensions, is the least well known value. The range of hydraulic conductivity for the Drift Aquifer can vary by several orders of magnitude. For example, the Metropolitan Council groundwater model (Metro Model 2) identified horizontal hydraulic conductivity for Quaternary deposits at 20 ft/day to 240 ft/day with a mean of 80 ft/day. Also, this calculation assumes that the gradient and aquifer thickness are constant in all directions, which greatly simplifies the natural condition.

The theoretical capture area of well W420 is approximately 800 feet wide using a pumping rate of 40 gallons per minute, a hydraulic conductivity of 80 ft/day, a gradient of 0.002 (USGS WSP 2211) and an aquifer thickness of 60 feet (well log for W33R, Attachment C). The theoretical capture area of well W439 is 1160 feet wide using a pumping rate of 58 gpm and the same other values. However, the assumptions required for these calculations are not well matched to the anisotropic characteristics of the Drift Aquifer. For example, nearby monitoring wells W9 ( only 110 feet south of well W420) and W425 (approximately 72 feet northwest of well W439) do not show drawdown from the pumping wells, and several episodes of turning the pumps off and on

confirm a lack of response in the nearby monitoring wells. This lack of response may be due to till layers that act as confining layers in the local areas of the pumping wells, or other heterogeneities. Thus the three dimensional size and shape of the capture areas of the pumping wells, and the three dimensional distribution of PAH in the Drift Aquifer, are not known to a degree sufficient to fully document the effectiveness of the pumping wells.

Figure 6 shows the theoretical extent of the W420 and W439 capture areas based on the calculations presented above and well W420 appears to be hydraulically controlling most of the bog area as required by the CD-RAP. However, the capture areas shown in Figure 6 do not take into account three dimensional characteristics of the Drift Aquifer such the clay layer noted on the boring log for B149 (Attachment C) that can influence groundwater flow and PAH migration.

# 8.0 DATA QUALITY ASSESSMENT

In accordance with the 2011 Sampling Plan, all laboratory data packages underwent a data quality assessment (DQA). The DQA was conducted to determine whether or not the reported laboratory data may be used for decision-making purposes. Results of the data quality assessment can be found at the end of each laboratory data package. The laboratory reports of the 2011 analytical data are included in the Appendices. The Guide to Appended Laboratory Results for all of 2011 precedes the Appendices.

The basis for the review, including the elements to be reviewed and applicable validation guidelines were defined in the Quality Assurance Project Plan (QAPP). The 2011 DQA was conducted as follows. The number of samples was checked to verify that the results corresponded to the analytical requests designated on the chain of custody. The chain of custody was examined to determine the completeness pertaining to sampling dates, times, quantities, and analyses performed. The sample holding times, preservation, and cooler temperatures were noted. The method blanks, field blanks, equipment blanks, and trip blanks were examined for any contamination problems. Surrogate spike recoveries were checked to confirm they were within the range determined by the QAPP quality control (QC) limits. Matrix spikes and laboratory control samples (LCS) were reviewed to confirm they meet the QC acceptance criteria. All duplicate samples were checked for precision. In addition, sample quantitation limits (SQLs) were compared to those required in the QAPP.

A full data validation was completed on three of 15 data packages, representing 31 of 79 samples, or approximately 40% of the samples. The full data validation includes all of the items reviewed in the DQA plus a review of the gas chromatography/mass spectrometry (GC/MS) tuning, the initial and continuing calibrations, and internal standard performance.

All 15 of the 2011 laboratory data packages were reviewed during the DQA. The data packages contain usable results for all wells that were sampled in 2011. The holding times for aqueous PAH analysis require extraction to occur within seven days after collection. All sample holding times were met during 2011. Cooler temperatures for overnight shipments were all within the QAPP acceptance criteria of 4 ± 2º C. No more than one of the three surrogates used had recoveries lower than the stated laboratory QAPP control limits for any individual 2011 sample. Therefore, none of the data were qualified based on the surrogate recoveries. For all samples that were diluted for analysis, the Sample Quantitation Limits (SQLs) were checked to confirm they were adjusted accordingly.

PAH were detected in the method blanks and/or field blanks for several of the 2011 data packages. All results with method blank concentrations are qualified with a “B”. All concentrations qualified with a B are included in the total PAH calculations. No samples exceeded the action levels established for each compound (the action level is 5 times the concentration found in the blank) in any of the data packages that had Method Blank contamination. All estimated data (“J” qualifier) and concentrations qualified with a B are included as part of

the PAH sums that constitute the Drinking Water Criteria and the Advisory Levels for this project. Because none of the samples exceeded the Drinking Water Criteria or the Advisory Levels based on the addition of the estimated data to the various PAH sums, the usability of the data is not compromised.

Overall, the 2011 laboratory data was found to be usable for evaluating PAH concentrations in the ground water and decision-making purposes. Criteria for validation actions were specified in the QAPP, data review worksheets or the appropriate validation guidelines and were given precedence in that order. QAPP criteria were used for surrogate, MS/MSD, and LCS recoveries. The 2011 sampling data have been reviewed and the QAPP goals for field and laboratory completeness have been met.

This project benefits from years of collecting high quality data in accordance with the Agency approved Sampling Plan and QAPP. Therefore, an additional measure of quality assurance is gained by comparing current analytical results to the historical analytical results. The findings of CPAH above the CD-RAP drinking water criteria in sample SLP10TEXTENDED-091311, and the subsequent levels of PAH found in the method blanks during the analyses of re-sampled SLP10T, indicate a concern for data quality. The laboratory could not identify a specific cause for these anomalous findings, but offered the following discussion:

> "TestAmerica Denver has supported the low level analysis of polyaromatic hydrocarbons (PAHs) for the City of St. Louis project for several years. The method was designed to support reporting limits in the part per trillion (ppt) range. The laboratory purchased custom glassware that accommodates a 4-liter aliquot of sample for extraction. The extract is then concentrated to a final volume of 1 mL, resulting is a 4000 fold concentration of the PAHs. Analysis of the extract by gas chromatography/mass spectrometry (GCMS), with the instrument in the selected ion monitoring (SIM) mode is then utilized. The methodology has a number of complexities and challenges that can be difficult to overcome.
>
> The Denver laboratory has struggled with reproducibility and sensitivity problems. Original validation studies were performed when all glassware utilized in the extraction of samples was relatively new. As glassware undergoes repeated use and cleaning, the laboratory has struggled to reproduce the sensitivity obtained in the original method detection limit studies. The 4-liter extraction apparatus has a large surface area that develops active sites even with minimal use. At the very low concentrations, this can cause significant losses of some of the PAH compounds. Currently a method detection limit verification spike is required to be analyzed with each sampling event. This low level spike is used by the laboratory to verify that the losses during the extraction process have are not significant enough to compromise the required reporting limits.
>
> The second significant challenge is the control of laboratory background and reagents to levels low enough that these do not contribute significantly to the reported sample results. There are a number of factors that can cause problems. The first is obtaining reagents that are controlled to the required ppt method detection and reporting limits. The reagent water used for method blanks and laboratory

control spikes has to be pre-extracted. Despite the pre-extraction process, there are still frequent low level (less than the reporting limit) detections in the method blanks. The method blank detections are typically the more common PAH compounds, such as naphthalene, but other analytes have also been detected on a less frequent basis. For example, an evaluation of lab historical data indicates that naphthalene is detected in the method blank 90% of the time, while benzo(a)pyrene has been detected in 18% of the method blanks.

Because of the uncertainty in the method detection limit procedure described in 40 CFR, the laboratory likes to have at least a factor of two times between the statistically derived method detection limit and the reporting limit. In this case, the project required reporting limits were written into the quality assurance project plan many years ago. There are a couple of cases where the project reporting limit is very close or equivalent to the method detection limit (for example, perylene). In these cases, the probability of a false negative could be significant.

Given the developments in technology since the implementation of this procedure, there may be other extraction or analytical techniques that will support the project. One example is the use of solid phase extraction. This could simplify a number of the issues involved with the extraction procedures. Other options might include the use of high performance liquid chromatography coupled with mass spectrometry. This technique might not require any extraction process."

Based on the laboratory's assessment of the existing ultra low level method, and their self-assessment of their ability to perform this test, an alternative method should be considered for use on this project. The technological advances in laboratory sciences and updated toxicological information about the health risks of PAH should be used to refine the list of analytes and the method(s) used to measure PAH in St. Louis Park groundwater.

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# Tables

**Table 1**
**Historical Summary of Other PAH and CPAH Analytical Results**
**1988 through 2011**

**SLP11, SLP12, SLP13, and SLP17**

All concentrations reported in nanograms per liter (ng/l)

CD-RAP Drinking Water Criterion = 280 ng/l

| SLP11 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-88 | 0 [3] | 42 |
| 6-89 | 0 | 34 |
| 3-90 | Out of Service | |
| 3-91 | 0 | 43 |
| 5-92 | 0 | 43 |
| 3-93 | 0 | 50 |
| 3-94 | 0 | 66 |
| 10-95 | 3 | 113 |
| 6-96 | 0 | 109 |
| 10-97 | 0 | 78 |
| 5-98 | 0 | 70 |
| 5-99 | 0 | 151 |
| 9-00 | 0 | 22 |
| 8-01 | 0 | 19 |
| 9-02 | Out of Service | |
| 8-03 | 46 | 37 |
| 2-04 | 0 | 26 |
| 3-04 | 0 | 22 |
| 8-04 | 0 | 24 |
| 9-05 | 0 | 27 |
| 5-06 | 3 | 25 |
| 5-07 | 0 | 29 |
| 8-08 | 0 | 28 |
| 5-09 | 0 | 10 |
| 9-10 | 0 | 11 |
| 9-11 | 0 | 92 |

| SLP12 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-88 | 0 | 11 |
| 6-89 | 0 | 16 |
| 3-90 | 0 | 109 |
| 3-91 | 0 | 21 |
| 5-92 | 1 | 25 |
| 3-93 | 0 | 9 |
| 3-94 | 0 | 21 |
| 10-95 | 0 | 9 |
| 6-96 | 0 | 3 |
| 10-97 | 0 | 12 |
| 5-98 | 0 | 3 |
| 9-99 | 0 | 10 |
| 9-00 | 0 | 11 |
| 8-01 | 0 | 2 |
| 9-02 | 3 | 7 |
| 8-03 | 0 | 2 |
| 8-04 | 0 | 20 |
| 9-05 | 0 | 5 |
| 8-06 | 0 | 4 |
| 5-07 | 0 | 4 |
| 8-08 | 0 | 1 |
| 5-09 | 0 | 0 |
| 9-10 | 0 | 2 |
| 9-11 | 0 | 4 |

| SLP13 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-88 | 0 | 15 |
| 6-89 | 0 | 9 |
| 3-90 | 0 | 14 |
| 3-91 | 0 | 13 |
| 5-92 | 2 | 11 |
| 6-93 | 0 | 11 |
| 12-94 | 0 | 28 |
| 10-95 | 0 | 9 |
| 6-96 | 0 | 5 |
| 10-97 | 0 | 22 |
| 5-98 | 0 | 4 |
| 5-99 | 0 | 15 |
| 9-00 | 0 | 6 |
| 8-01 | 0 | 0 |
| 9-02 | 0 | 0 |
| 8-03 | 0 | 0 |
| 8-04 | Out of Service | |
| 9-05 | 0 | 10 |
| 5-06 | 3 | 8 |
| 5-07 | 0 | 5 |
| 8-08 | 0 | 11 |
| 5-09 | 0 | 0 |
| 9-10 | 0 | 4 |
| 9-11 | Out of Service | |

| SLP17 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 12 |
| 6-89 | 0 | 12 |
| 6-90 | 1 | 18 |
| 3-91 | 0 | 41 |
| 11-92 | 3 | 41 |
| 6-93 | 0 | 12 |
| 12-94 | 4 | 35 |
| 10-95 | 0 | 8 |
| 6-96 | 0 | 5 |
| 10-97 | 62 | 406 |
| 5-98 | 0 | 3 |
| 5-99 | 0 | 40 |
| 9-00 | Out of Service | |

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1)), consist of the sum of:

| | | |
|---|---|---|
| benzo(a) anthracene | chrysene | quinoline* |
| benzo(a)pyrene | dibenzo(a,h)anthracene | benzo(j)fluoranthene** |
| benzo(b)flouranthene | indeno(1,2,3-cd)pyrene | benzo(g,h,i)perylene |

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included in the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo(j)flouranthene can not be consistently separated by the laboratory. Therefore, if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAHs (as listed in the CD/RAP (A.1.2), consists of the sum of:

| | | | |
|---|---|---|---|
| acenapthene | benzo(e)pyrene | 2,3-dihydroindene | 1-methylnaphthalene |
| acenaphthylene | benzo(b)thiophene | fluoranthene | 2-methylnaphthalene |
| acridine | biphenyl | fluorene | naphthalene |
| anthracene | carbazole | indene | perylene |
| benzo(k)fluoranthene | dibenzothiophene | indole | phenanthrene |
| 2,3-benzofuran | dibenzofuran | | pyrene |

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit.

**Table 2**

**Historical Summary of Other PAH and CPAH in Well W105**
**1988 Through 2010**

All concentrations reported in nanograms per liter (ng/l)

| W105 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 2-88 | 0 [3] | 9,000 |
| 6-88 | 0 | 2,400 |
| 9-88 | 0 | 3,670 |
| 12-88 | 0 | 2,035 |
| 6-89 | 0 | 1,400 |
| 12-89 | 0 | 1,086 |
| 5-90 | 0 | 2,347 |
| 8-90 | 0 | 2,600 |
| 5-91 | 9.5 | 2,164 |
| 8-91 | 0 | 1,014 |
| 2-92 | 0 | 2,185 |
| 6-92 | 355 | 5,057 |
| 11-92 | 0 | 30,900 |
| 1-93 | 38 | 1,797 |
| 1-93 | 23 | 1,966 |
| 3-94 | 60 | 2,576 |
| 5-96 | 29 | 2,746 |
| 4-98 | 0 | 5,493 |
| 5-00 | 89 | 5,593 |
| 6-02 | 142 | 5,247 |
| 5-04 | 33 | 2,363 |
| 5-06 | 200 | 5,725 |
| 5-08 | 195 | 14,546 |
| 3-09 | 273 | 4,107 |
| 3-09 | 166 | 4,450 |
| 6-10 | 105 | 13,797 |
| 12-10 | 17 | 984 |
| 12-10 | 23 | 894 |

**NOTES:**

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1), consist of the sum of:

- benzo(a) anthracene
- benzo(a)pyrene
- benzo(b)flouranthene
- chrysene
- dibenzo(a,h)anthracene
- indeno(1,2,3-cd)pyrene
- quinoline*
- benzo(j)fluoranthene**
- benzo(g,h,i)perylene

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included in the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo-(j)flouranthene can not be consistently separated by the laboratory. Therefore if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAH cessation criterion is 10,000 ng/l. Total Other PAH consists of the sum of:

- acenapthene
- acenaphthylene
- acridine
- anthracene
- benzo(k)fluoranthene
- 2,3-benzofuran
- benzo(e)pyrene
- benzo(b)thiophene
- biphenyl
- carbazole
- dibenzofuran
- dibenzothiophene
- 2,3-dihydroindene
- fluoranthene
- fluorene
- indene
- indole
- 1-methylnaphthalene
- 2-methylnaphthalene
- naphthalene
- perylene
- phenanthrene
- pyrene

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit.

Table 3 Historical Summary of Other PAH and CPAH Analytical Results for
Prairie Du Chien-Jordan Aquifer Wells, 1988 through 2011
Results in nanograms per liter

CD-RAP Drinking Water Criteria:

Sum of CPAH.....28 ng/l

Sum of OPAH.....280 ng/l

**SLP4**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 [3] | 244 |
| 10-89 | 0 | 232 |
| 3-90 | 0 | 210 |
| 6-90 | 2 | 239 |
| 11-92 | 3 | 309 |
| 3-93 | 0 | 237 |
| 6-93 | 0 | 259 |
| 3-94 | 0 | 552 |
| 10-94 | 1 | 571 |
| 9-95 | 3 | 561 |
| 12-95 | 6 | 229 |
| 6-96 | 0 | 431 |
| 9-96 | 0 | 526 |
| 4-97 | 0 | 596 |
| 9-97 | 0 | 533 |
| 4-98 | 0 | 440 |
| 9-98 | 1 | 361 |
| 11-98 | 5 | 91 |
| 5-99 | 0 | 485 |
| 8-99 | 0 | 328 |
| 5-00 | 0 | 465 |
| 9-00 | 0 | 376 |
| 5-01 | 3 | 397 |
| 5-02 | 0 | 281 |
| 5-03 | 0 | 249 |
| 5-04 | 0 | 248 |
| 9-05 | 0 | 107 |
| 5-06 | 0 | 185 |
| 5-07 | 0 | 99 |
| 4-08 | 0 | 107 |
| 5-09 | 0 | 107 |
| 6-10 | 0 | 156 |
| 9-11 | 0 | 118 |

**SLP14**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 112 |
| 6-89 | 0 | 134 |
| 9-89 | 0 | 84 |
| 3-90 | 0 | 98 |
| 8-90 | 0 | 145 |
| 5-91 | 1 | 99 |
| 8-91 | 0 | 19 |
| 5-92 | 1 | 90 |
| 8-93 | 0 | 78 |
| 9-94 | 0 | 57 |
| 6-95 | 0 | 89 |
| 6-96 | 0 | 52 |
| 4-97 | 0 | 46 |
| 5-98 | 0 | 55 |
| 5-99 | 0 | 49 |
| 5-00 | 0 | 50 |
| 5-02 | 0 | 25 |
| 5-04 | Out of Service | |
| 5-06 | 82 | 17 |
| 7-06 | 0 | 14 |
| 8-06 | 0 | 19 |
| 8-08 | 0 | 28 |
| 6-10 | 30 | 46 |
| 7-10 | 0 | 10 |
| 7-10 | 0 | 9 |

**SLP5**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 10-88 | 0 | 613 |
| 6-89 | 0 | 94 |
| 6-90 | 0 | 49 |
| 5-91 | 1 | 42 |
| 6-92 | 1 | 71 |
| 8-93 | 5 | 77 |

**SLP8**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 18 |
| 6-89 | 0 | 8 |
| 10-89 | 0 | 9 |
| 3-90 | 0 | 15 |
| 3-91 | 0 | 50 |
| 5-92 | 1 | 19 |
| 11-92 | 2 | 9 |

**H3**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 378 |
| 6-89 | 0 | 93 |
| 9-89 | 0 | 370 |
| 6-90 | 0 | 188 |
| 8-90 | 0 | 5,300 |
| | Abandoned | |

**SLP10**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 8,200 |
| 10-89 | 0 | 5,120 |
| 6-90 | 0 | 5,403 |
| 8-90 | 0 | 7,386 |
| 5-91 | 5 | 315 |
| 6-92 | 0 | 3,070 |
| 8-93 | 0 | 2,091 |
| 6-94 | 0 | 2,174 |
| 6-95 | 0 | 1,737 |
| 6-96 | 0 | 1,742 |
| 10-97 | 0 | 1,859 |
| 5-98 | 0 | 1,354 |
| 5-99 | 0 | 1,452 |
| 5-00 | 0 | 2,947 |
| 5-01 | 0 | 1,929 |
| 6-02 | 2 | 1,453 |
| 9-03 | 8 | 1,327 |
| 5-05 | 9 | 2,101 |
| 5-06 | 1 | 1,524 |
| 5-07 | 3 | 1,476 |
| 5-08 | 1 | 1,797 |
| 9-10 | 1 | 529 |
| 9-11 | 3 | 537 |

**SLP6**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 33 |
| 10-88 | 0 | 55 |
| 6-89 | 7 | 52 |
| 9-89 | 0 | 36 |
| 10-89 | 0 | 40 |
| 3-90 | 0 | 45 |
| 6-90 | 3 | 80 |
| 8-90 | 0 | 117 |
| 10-90 | 0 | 68 |
| 8-91 | 0 | 123 |
| 5-92 | 1 | 123 |
| 11-92 | 0 | 173 |
| 3-93 | 0 | 212 |
| 6-93 | 0 | 113 |
| 2-94 | 1 | 74 |
| 6-95 | 0 | 88 |
| 6-96 | 1 | 180 |
| 8-96 | 0 | 178 |
| 10-96 | 0 | 189 |
| 1-97 | 0 | 236 |
| 2-97 | 0 | 210 |
| 3-97 | 0 | 277 |
| 6-97 | 0 | 217 |
| 5-98 | 0 | 146 |
| 8-98 | 0 | 173 |
| 8-99 | 0 | 174 |
| 5-00 | 0 | 218 |
| 8-01 | 0 | 158 |
| 11-01 | 0 | 138 |
| 3-02 | 0 | 181 |
| 5-02 | 0 | 189 |
| 9-02 | 0 | 219 |
| 10-02 | 0 | 178 |
| 3-03 | 0 | 124 |
| 5-03 | 0 | 165 |
| 8-03 | 5 | 137 |
| 11-03 | 0 | 238 |
| 3-04 | 0 | 235 |
| 5-04 | 0 | 161 |
| 8-04 | 0 | 244 |
| 11-04 | 0 | 187 |
| 3-05 | 0 | 205 |
| 5-05 | 0 | 197 |
| 9-05 | 3 | 188 |
| 11-05 | 0 | 194 |
| 3-06 | 0 | 127 |
| 5-06 | 0 | 275 |
| 8-06 | 6 | 220 |
| 11-06 | 0 | 151 |
| 3-07 | 0 | 196 |
| 5-07 | 0 | 139 |
| 8-07 | 0 | 220 |
| 11-07 | 0 | 168 |
| 3-08 | 0 | 173 |
| 4-08 | 0 | 140 |
| 8-08 | 0 | 196 |
| 11-08 | 0 | 213 |
| 3-09 | 0 | 212 |
| 5-09 | 0 | 144 |
| 8-09 | 0 | 221 |
| 11-09 | 0 | 213 |
| 3-10 | 0 | 198 |
| 6-10 | 0 | 251 |
| 9-10 | 0 | 192 |
| 12-10 | 0 | 183 |
| 3-11 | 0 | 183 |
| 6-11 | 1 | 190 |
| 9-11 | 0 | 188 |

Table 3 Historical Summary of Other PAH and CPAH Analytical Results for Prairie Du Chien-Jordan Aquifer Wells, 1988 through 2011

CD-RAP Drinking Water Criteria:

Sum of CPAH.....28 ng/l

Sum of OPAH.....280 ng/l

**SLP7**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 78 |
| 10-88 | 0 | 51 |
| 6-89 | 0 | 61 |
| 9-89 | 0 | 25 |
| 10-89 | 0 | 25 |
| 3-90 | 0 | 43 |
| 6-90 | 2 | 48 |
| 8-90 | 2 | 91 |
| 10-90 | 0 | 49 |
| 3-91 | 0 | 50 |
| 5-91 | 0 | 37 |
| 8-91 | 0 | 65 |
| 5-92 | 1 | 40 |
| 3-93 | 0 | 32 |
| 6-94 | 0 | 60 |
| 6-95 | 0 | 28 |
| 6-96 | 0 | 22 |
| 4-97 | 0 | 11 |
| 5-98 | 0 | 17 |
| 5-99 | 0 | 17 |
| Out of Service | | |

**SLP16**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 48 |
| 6-89 | 0 | 28 |
| 9-89 | 0 | 24 |
| 8-90 | 8 | 374 |
| 11-90 | 0 | 59 |
| 5-91 | 1 | 32 |
| 8-91 | 0 | 64 |
| 11-92 | 1 | 42 |
| 8-93 | 0 | 11 |
| 6-94 | 0 | 22 |
| 6-95 | 0 | 13 |
| 6-96 | 0 | 8 |
| 9-97 | 0 | 9 |
| 5-98 | 0 | 7 |
| 5-99 | 0 | 0 |
| 5-00 | 0 | 9 |
| 5-02 | 0 | 0 |
| 5-04 | 0 | 8 |
| 5-06 | 0 | 12 |
| 8-08 | 0 | 5 |
| 6-10 | 0 | 1 |

**SLP15**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 6-89 | 0 | 4,026 |
| 11-92 | 0 | 3,206 |
| 8-93 | 0 | 2,091 |
| 5-04 | 0 | 168 |
| 5-09 | 0 | 157 |

**E15**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 11 |
| 6-89 | 0 | 16 |
| 6-90 | 0 | 11 |
| 5-91 | 0 | 13 |
| 5-92 | 0 | 23 |
| 8-93 | 0 | 4 |
| 6-94 | 0 | 6 |
| 6-95 | 0 | 8 |
| 6-96 | 0 | 10 |
| 10-96 | 0 | 29 |
| 6-97 | 0 | 3 |
| 10-97 | 0 | 14 |
| 5-98 | 0 | 22 |
| 8-98 | 0 | 7 |
| 5-99 | 0 | 38 |
| 8-99 | 0 | 18 |
| 5-00 | 0 | 26 |
| 9-00 | 0 | 14 |
| 5-01 | 0 | 27 |
| 9-02 | 0 | 5 |
| 8-03 | 0 | 5 |
| 5-04 | 0 | 15 |
| 9-05 | 0 | 26 |
| 5-06 | 0 | 12 |
| 5-07 | 0 | 9 |
| 5-08 | 0 | 5 |
| 5-09 | 0 | 5 |
| 9-10 | 0 | 7 |
| 6-11 | 0 | 8 |

**E13**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 4 |
| 6-89 | 0 | 20 |
| 9-89 | 0 | 6 |
| 6-90 | 0 | 13 |
| 8-90 | 2 | 227 |
| 5-91 | 1 | 11 |
| 8-91 | 0 | 12 |
| 5-92 | 0 | 43 |
| 8-93 | 0 | 4 |
| 6-94 | 0 | 3 |
| 6-96 | 0 | 3 |
| 10-96 | 0 | 4 |
| 4-97 | 0 | 38 |
| 10-97 | 0 | 8 |
| 5-98 | 0 | 21 |
| 8-98 | 0 | 36 |
| 5-99 | 0 | 15 |
| 8-99 | 0 | 35 |
| 5-00 | 0 | 39 |
| 9-00 | 0 | 49 |
| 5-01 | 0 | 41 |
| 5-02 | 0 | 80 |
| 8-03 | 7 | 87 |
| 5-04 | 0 | 116 |
| 9-05 | 0 | 208 |
| 10-05 | 0 | 169 |
| 11-05 | 0 | 172 |
| 5-06 | 0 | 112 |
| 5-07 | 9 | 155 |
| 5-08 | 0 | 158 |
| 5-09 | 0 | 169 |
| 9-10 | 0 | 142 |
| 6-11 | 0 | 154 |
| 9-11 | 2 | 155 |

**E2**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 14 |
| 6-89 | 0 | 21 |
| 9-89 | 0 | 8 |
| 6-90 | 3 | 22 |
| 8-90 | 0 | 14 |
| 5-91 | 4 | 21 |
| 8-91 | 0 | 17 |
| 5-92 | 0 | 19 |
| 8-93 | 0 | 9 |
| 6-94 | 0 | 16 |
| 12-95 | 0 | 10 |
| 6-96 | 0 | 14 |
| 10-96 | 0 | 20 |
| 4-97 | 0 | 45 |
| 10-97 | 0 | 13 |
| 5-98 | 0 | 13 |
| 8-98 | 0 | 196 |
| 10-98 | 0 | 34 |
| 8-99 | 0 | 6 |
| 5-00 | 0 | 8 |
| 9-00 | 0 | 6 |
| 5-01 | 0 | 16 |
| 9-02 | 0 | 0 |
| 8-03 | 0 | 8 |
| 5-04 | 0 | 5 |
| 6-07 | 0 | 72 |
| 5-08 | 0 | 7 |
| 5-09 | 0 | 8 |
| 9-10 | 0 | 4 |
| 6-11 | 0 | 9 |

Table 3 Historical Summary of Other PAH and CPAH Analytical Results for Prairie Du Chien-Jordan Aquifer Wells, 1988 through 2011

CD-RAP Drinking Water Criteria:

Sum of CPAH.....28 ng/l

Sum of OPAH.....280 ng/l

| E3 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 15 |
| 6-89 | 0 | 15 |
| 6-90 | 1 | 17 |
| 8-91 | 0 | 13 |
| 5-92 | 4 | 21 |
| 8-93 | 0 | 5 |
| 6-94 | 0 | 7 |
| 6-95 | 0 | 8 |
| 6-96 | 0 | 3 |
| 6-97 | 0 | 4 |
| 5-98 | 0 | 3 |
| 5-99 | 0 | 0 |
| 5-00 | 0 | 0 |
| 5-01 | 0 | 16 |
| 5-02 | 0 | 0 |
| 8-03 | 0 | 1 |
| 5-04 | 0 | 4 |
| 9-05 | 0 | 5 |
| 5-06 | 0 | 8 |
| 5-09 | 0 | 0 |
| 9-10 | 0 | 2 |
| 6-11 | 0 | 3 |

| H6 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 19 |
| 6-89 | 0 | 16 |
| 6-90 | 0 | 15 |
| 5-91 | 0 | 16 |
| 5-92 | 0 | 16 |
| 8-93 | 0 | 3 |
| 6-94 | 0 | 6 |
| 6-95 | 0 | 3 |
| 6-96 | 0 | 3 |
| 4-97 | 0 | 2 |
| 5-98 | 0 | 5 |
| 5-99 | 0 | 5 |
| 5-00 | 0 | 5 |
| 5-02 | 0 | 0 |
| 5-04 | 0 | 6 |
| 5-06 | 5 | 99 |
| 4-08 | 0 | 16 |
| 9-10 | 0 | 96 |
| 1/1/2011 | NS | NS |

| W119 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 3 |
| 6-89 | 0 | 18 |
| 9-89 | 0 | 11 |
| 9-01 | 0 | 294 |
| Well Out of Service in 2002 | | |
| 10-03 | 1 | 196 |
| 5-04 | 0 | 126 |
| 8-04 | 0 | 226 |
| 5-05 | 0 | 152 |
| 9-05 | 0 | 140 |
| 5-06 | 0 | 210 |
| 8-06 | 0 | 148 |
| 5-07 | 0 | 136 |
| 8-07 | 0 | 138 |
| 8-08 | 0 | 105 |
| 5-09 | 0 | 76 |
| 8-09 | 0 | 124 |
| 6-10 | 0 | 95 |
| 9-10 | 0 | 131 |
| 6-11 | 0 | 61 |
| 9-11 | 3 | 95 |

| E7 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-96 | 0 | 3 |
| 10-96 | 0 | 5 |
| 6-97 | 0 | 3 |
| 10-97 | 0 | 2 |
| 5-98 | 0 | 1 |
| 8-98 | 0 | 6 |
| 5-99 | 0 | 5 |
| 8-99 | 0 | 2 |
| 5-00 | 0 | 16 |
| 9-00 | 0 | 9 |
| 5-01 | 0 | 22 |
| 5-02 | 0 | 29 |
| 8-03 | 0 | 22 |
| 5-04 | Out of Service | |

| W48 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 2,418 |
| 6-89 | 0 | 1,636 |
| 9-89 | 0 | 1,850 |
| 10-89 | 0 | 1,130 |
| 3-90 | 0 | 1,690 |
| 6-90 | 0 | 1,809 |
| 8-90 | 22 | 4,566 |
| 8-93 | 2 | 428 |
| 6-94 | 1 | 285 |
| 6-95 | 3 | 310 |
| 6-96 | 3 | 259 |
| 6-97 | 0 | 316 |
| 10-97 | 0 | 290 |
| 5-98 | 0 | 186 |
| 8-98 | 0 | 50 |
| 5-99 | 0 | 226 |
| 8-99 | 0 | 226 |
| 5-00 | 0 | 222 |
| 9-00 | 0 | 130 |
| 5-01 | 0 | 234 |
| 8-01 | 0 | 149 |
| 11-01 | 0 | 180 |
| 3-02 | 0 | 222 |
| 5-02 | 0 | 185 |
| 9-02 | 0 | 138 |
| 10-02 | 0 | 187 |
| 3-03 | 0 | 108 |
| 5-03 | 0 | 135 |
| 8-03 | 0 | 135 |
| 10-03 | 0 | 173 |
| 3-04 | 0 | 156 |
| 5-04 | 0 | 189 |
| 8-04 | 0 | 161 |
| 11-04 | 0 | 170 |
| 3-05 | 0 | 144 |
| 5-05 | 0 | 141 |
| 9-05 | 0 | 82 |
| 11-05 | 0 | 156 |

| MTK6 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 4 |
| 6-89 | 0 | 12 |
| 6-90 | 5 | 22 |
| 5-91 | 0 | 17 |
| 5-92 | 4 | 19 |
| 8-93 | 0 | 7 |
| 6-94 | 0 | 8 |
| 6-95 | 0 | 15 |
| 6-96 | 0 | 4 |
| 4-97 | 0 | 3 |
| 5-98 | 0 | 0 |
| 5-99 | 0 | 2 |
| 5-00 | 0 | 3 |
| 5-02 | 0 | 0 |
| 5-04 | 0 | 8 |
| 5-06 | 0 | 14 |
| 4-08 | 0 | 0 |
| 9-10 | 0 | 3 |

| W48 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 3-06 | 0 | 154 |
| 5-06 | 0 | 111 |
| 8-06 | 0 | 169 |
| 11-06 | 0 | 53 |
| 3-07 | 0 | 154 |
| 5-07 | 1 | 114 |
| 8-07 | 0 | 156 |
| 11-07 | 0 | 147 |
| 3-08 | 0 | 132 |
| 5-08 | 0 | 144 |
| 8-08 | 0 | 191 |
| 11-08 | 0 | 176 |
| 5-09 | 0 | 156 |
| 8-09 | 0 | 271 |
| 11-09 | 1 | 225 |
| 3-10 | 0 | 164 |
| 6-10 | 1 | 187 |
| 9-10 | 0 | 188 |
| 12-10 | 0 | 152 |
| 3-11 | 0 | 143 |
| 6-11 | 0 | 151 |
| 9-11 | 8 | 153 |
| 12-11 | 0 | 145 |

Table 3 Historical Summary of Other PAH and CPAH Analytical Results for Prairie Du Chien-Jordan Aquifer Wells, 1988 through 2011

CD-RAP Drinking Water Criteria:

Sum of CPAH.....28 ng/l

Sum of OPAH.....280 ng/l

**W23**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 9-88 | 0 | 111,100 |
| 12-88 | 0 | 123,100 |
| 3-89 | 0 | 120,200 |
| 6-89 | 0 | 117,600 |
| 9-89 | 0 | 106,300 |
| 3-90 | 0 | 129,100 |
| 8-90 | 0 | 114,700 |
| 3-91 | 0 | 87,800 |
| 6-91 | 0 | 71,800 |
| 9-91 | 0 | 91,200 |
| 10-91 | 0 | 82,600 |
| 2-92 | 0 | 67,600 |
| 9-92 | 0 | 78,000 |
| 6-94 | 0 | 60,000 |
| 10-94 | 0 | 64,000 |
| 5-95 | 4,000 | 128,000 |
| 9-95 | 0 | 70,000 |
| 4-96 | 0 | 48,000 |
| 7-96 | 0 | 50,000 |
| 4-97 | 0 | 34,000 |
| 10-97 | 0 | 47,000 |
| 2-98 | 0 | 0[3] |
| 11-98 | 0 | 42,090 |
| 4-99 | 0 | 25,970 |
| 8-99 | 0 | 14,850 |
| 5-00 | 0 | 8,790 |
| 9-00 | 0 | 37,980 |
| 12-00 | 0 | 25,000 |
| 4-01 | 472 | 25,840 |
| 3-02 | 0 | 28,700 |
| 6-02 | 654 | 29,832 |
| 9-03 | 514 | 23,391 |
| 5-04 | 275 | 17,796 |
| 5-05 | 254 | 25,141 |
| 5-06 | 111 | 12,181 |
| 5-07 | 292 | 19,603 |
| 5-08 | 215 | 18,793 |
| 5-09 | 365 | 14,357 |
| 6-10 | 313 | 19,088 |
| 12-10 | 389 | 14,181 |
| 6-11 | 144 | 12,830 |

**W401**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 12 |
| 6-89 | 0 | 15 |
| 6-90 | 0 | 27 |
| 5-91 | 0 | 28 |
| 5-92 | 0 | 10 |
| 8-93 | 1 | 10 |
| 6-94 | 0 | 8 |
| 6-95 | 0 | 16 |
| 6-96 | 0 | 19 |
| 10-96 | 0 | 29 |
| 6-97 | 0 | 174 |
| 10-97 | 0 | 121 |
| 5-98 | 0 | 66 |
| 8-98 | 0 | 5 |
| 5-99 | 0 | 64 |
| 8-99 | 0 | 23 |
| 5-00 | 0 | 105 |
| 9-00 | 0 | 158 |
| 5-01 | 0 | 295 |
| 5-02 | 0 | 149 |
| 8-03 | 0 | 60 |
| 5-04 | 0 | 195 |
| 10-05 | 0 | 92 |
| 5-06 | 0 | 48 |
| 5-07 | 0 | 41 |
| 4-08 | 0 | 35 |
| 5-09 | 0 | 42 |
| 6-10 | 0 | 9 |
| 9-11 | 0 | 48 |

**W29**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 495 |
| 6-89 | 28 | 338 |
| 6-90 | 4 | 372 |
| 5-91 | 6 | 405 |
| 5-92 | 12 | 531 |
| 8-93 | 39 | 1,887 |
| 6-94 | 9 | 749 |
| 6-95 | 0 | 1,164 |
| 6-96 | 0 | 82 |
| 4-97 | 0 | 418 |
| 5-98 | 0 | 261 |
| 5-99 | 0 | 99 |
| 5-00 | 3 | 212 |
| 5-01 | 3 | 175 |
| 5-02 | 0 | 44 |
| 5-03 | 0 | 62 |
| 5-04 | 11 | 157 |
| 9-05 | 0 | 21 |
| 5-06 | 9 | 45 |
| 5-07 | 1 | 14 |
| 5-08 | 0 | 20 |
| 5-09 | 1 | 27 |
| Well Not Accessible | | |

**W40**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 1,062 |
| 6-89 | 0 | 540 |
| 6-90 | 16 | 705 |
| 5-91 | 5 | 474 |
| 5-92 | 2 | 283 |
| 8-93 | 5 | 345 |
| 6-94 | 0 | 484 |
| 6-95 | 0 | 369 |
| 6-96 | 0 | 498 |
| 4-97 | 0 | 624 |
| 5-98 | 0 | 220 |
| 5-99 | 0 | 299 |
| 5-00 | 2 | 129 |
| 5-01 | 7 | 390 |
| Abandoned | | |

**W70**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
|---|---|---|
| 8-88 | 0 | 481 |
| 6-89 | 5 | 426 |
| 9-89 | 0 | 280 |
| 6-90 | 9 | 560 |
| 5-91 | 8 | 669 |
| 6-92 | 8 | 401 |
| 8-93 | 2 | 317 |
| 6-94 | 4 | 299 |
| 6-95 | 0 | 384 |
| 6-96 | 0 | 342 |
| 4-97 | 0 | 335 |
| 5-98 | 0 | 307 |
| 5-99 | 0 | 254 |
| 5-00 | 0 | 3 |
| Well Out of Service in 2001, 2002 | | |
| 5-03 | 0 | 0 |
| 8-04 | Out of Service | |
| 9-05 | 7 | 18 |
| 5-06 | 0 | 5 |
| Abandoned in 2007 | | |

Table 3 Historical Summary of Other PAH and CPAH Analytical Results for Prairie Du Chien-Jordan Aquifer Wells, 1988 through 2011

CD-RAP Drinking Water Criteria:

Sum of CPAH.....28 ng/l

Sum of OPAH.....280 ng/l

| W402 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 9-89 | 0 | 151 |
| 6-90 | 47 | 720 |
| 8-90 | 16 | 133 |
| 5-91 | 16 | 408 |
| 8-91 | 0 | 18,320 |
| 6-92 | 12 | 895 |
| 8-93 | 7 | 145 |
| 6-94 | 5 | 104 |
| 6-95 | 0 | 567 |
| 6-96 | 13 | 383 |
| 4-97 | 0 | 257 |
| 5-98 | 0 | 349 |
| 5-99 | 1 | 545 |
| 5-00 | 0 | 1,287 |
| 5-01 | 0 | 267 |
| 5-02 | 13 | 165 |
| 5-03 | 3 | 56 |
| 5-04 | 73 | 67 |
| 5-05 | 96 | 88 |
| 5-06 | 3 | 92 |
| 5-07 | 9 | 67 |
| 4-08 | 0 | 48 |
| 5-09 | 0 | 149 |
| 6-10 | 1 | 77 |
| 9-11 | 0 | 72 |

| W403 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 8-88 | 0 | 57 |
| 6-89 | 40 | 974 |
| 9-89 | 0 | 177 |
| 8-90 | 49 | 1,102 |
| 5-91 | 110 | 976 |
| 8-91 | 0 | 11,570 |
| 6-92 | 19 | 816 |
| 8-93 | 7 | 516 |
| 6-94 | 7 | 1,271 |
| 6-95 | 0 | 543 |
| 6-96 | 3 | 182 |
| 4-97 | 0 | 172 |
| 5-98 | 0 | 11 |
| 5-99 | 0 | 169 |
| 5-00 | 0 | 195 |
| 5-01 | 0 | 458 |
| 5-02 | 3 | 134 |
| 5-03 | 125 | 66 |
| 5-04 | 131 | 88 |
| 9-05 | 4 | 83 |
| 5-06 | 2 | 74 |
| 5-07 | 302 | 304 |
| 5-08 | 1003 | 796 |
| 5-09 | 450 | 796 |
| 6-10 | 121 | 162 |
| 9-11 | 178 | 91 |

| W406 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-89 | 0 | 36 |
| 10-89 | 0 | 26 |
| 6-90 | 8 | 43 |
| 8-90 | 15 | 119 |
| 5-91 | 1 | 30 |
| 8-91 | 1 | 40 |
| 5-92 | 6 | 53 |
| 8-93 | 0 | 22 |
| 6-94 | 0 | 31 |
| 6-95 | 0 | 34 |
| 6-96 | 0 | 21 |
| 4-97 | 0 | 27 |
| 5-98 | 0 | 15 |
| 5-99 | 0 | 28 |
| 5-00 | 0 | 30 |
| 5-02 | Out of Service | |
| 5-04 | 0 | 10 |
| 5-06 | 2 | 21 |
| 8-08 | 0 | 11 |
| 6-10 | 0 | 7 |

**NOTES:**

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1)), consist of the sum of:

benzo(a)anthracene
benzo(a)pyrene
benzo(b)flouranthene
chrysene
dibenz(a,h)anthracene
indeno(1,2,3-cd)pyrene
quinoline*
benzo(j)fluoranthene**
benzo(g,h,i)perylene

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included in the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo(j)fluoranthene can not be consistently separated by the laboratory. Therefore if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAHs (as listed in the CD/RAP (A.1.2), consists of the sum of:

acenapthene
acenaphthylene
acridine
anthracene
benzo(k)fluoranthene
2,3-benzofuran
benzo(e)pyrene
benzo(b)thiophene
biphenyl
carbazole
dibenzofuran
dibenzothiophene
2,3-dihydroindene
fluoranthene
fluorene
indene
indole
1-methylnaphthalene
2-methylnaphthalene
naphthalene
perylene
phenanthrene
pyrene

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit.

**Table 4**
**Historical Summary of Other PAH and**
**CPAH Analytical Results for St. Peter Aquifer Wells**
**1988 Through 2011**

All concentrations reported in nanograms per liter (ng/l)

| SLP3 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 [3] | 8 |
| 10-88 | 0 | 9 |
| 6-89 | 0 | 10 |
| 10-89 | 0 | 15 |
| 6-90 | 5 | 29 |
| 8-90 | 1 | 18 |
| 8-91 | 1 | 23 |
| 6-92 | 0 | 16 |
| 11-92 | 0 | 13 |
| 4-93 | 0 | 9 |
| 7-93 | 0 | 5 |
| 5-94 | 0 | 8 |
| 10-94 | 0 | 5 |
| 5-95 | 0 | 7 |
| 10-95 | 0 | 16 |
| 6-96 | 0 | 11 |
| 10-96 | 0 | 4 |
| 4-97 | 0 | 6 |
| 10-97 | 0 | 5 |
| 4-98 | 0 | 7 |
| 9-98 | 0 | 247 |
| 5-99 | 0 | 7 |
| 8-99 | 0 | 0 |
| 5-00 | 0 | 5 |
| 9-00 | 2 | 25 |
| 5-01 | 0 | 10 |
| 8-01 | 0 | 2 |
| 5-02 | 0 | 15 |
| 9-02 | 0 | 0 |
| 5-03 | 0 | 0 |
| 8-03 | 0 | 0 |
| 5-04 | 0 | 6 |
| 8-04 | 0 | 8 |
| 5-05 | 0 | 10 |
| 9-05 | 2 | 13 |
| 5-06 | 1 | 5 |
| 8-06 | 0 | 5 |
| 5-07 | 0 | 4 |
| 8-07 | 1 | 5 |
| 8-08 | 0 | 2 |
| 5-09 | 0 | 0 |
| 8-09 | 0 | 0 |
| 6-10 | 0 | 2 |
| 9-10 | 0 | 3 |

| P116 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 8 | 196 |
| 10-88 | 0 | 3,770 |
| 6-89 | 1 | 82 |
| 10-89 | 3 | 42 |
| 8-90 | 2 | 20 |
| 4-91 | 0 | 61 |
| 8-91 | 3 | 40 |
| 6-92 | 13 | 118 |
| 11-92 | 10 | 219 |
| 4-93 | 4 | 52 |
| 7-93 | 2 | 38 |
| 5-94 | 1 | 64 |
| 11-94 | 0 | 66 |
| 5-95 | 0 | 50 |
| 10-95 | 0 | 53 |
| 6-96 | 0 | 7 |
| 10-96 | 0 | 43 |
| 4-97 | 0 | 35 |
| 10-97 | 0 | 82 |
| 4-98 | 5 | 148 |
| 9-98 | 0 | 60 |
| 5-99 | 4 | 50 |
| 8-99 | 0 | 55 |
| 5-00 | 2 | 36 |

| W14 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 57 | 95 |
| 10-88 | 0 | 439 |
| 6-11 | 75 | 98 |

| W24 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 | 3,309 |
| 10-88 | 0 | 3,622 |
| 4-91 | 0 | 4,023 |
| 8-91 | 0 | 4,160 |
| 6-92 | 0 | 3,380 |
| 11-92 | 0 | 3,650 |
| 4-93 | 0 | 2,950 |
| 7-93 | 0 | 3,294 |
| 5-94 | 0 | 2,669 |
| 11-94 | 0 | 4,029 |
| 5-95 | 0 | 3,190 |
| 10-95 | 0 | 1,550 |
| 5-96 | 0 | 974 |
| 10-96 | 0 | 1,603 |
| 4-97 | 0 | 1,513 |
| 10-97 | 0 | 1,340 |
| 4-98 | 0 | 689 |
| 9-98 | 0 | 1,120 |
| 4-99 | 0 | 2,085 |
| 9-99 | 0 | 3,590 |
| 5-00 | 0 | 940 |
| 5-01 | 0 | 152 |
| 9-01 | 0 | 619 |
| 6-02 | 0 | 439 |
| 9-02 | 0 | 307 |
| 6-03 | 0 | 335 |
| 9-03 | 0 | 246 |
| 5-04 | 0 | 212 |
| 8-04 | 0 | 188 |
| 5-05 | 0 | 102 |
| 9-05 | 0 | 130 |
| 5-06 | 11 | 72 |
| 8-06 | 0 | 93 |
| 5-07 | 0 | 65 |
| 5-08 | 0 | 24 |
| 8-08 | 0 | 53 |
| 5-09 | 0 | 26 |
| 8-09 | 0 | 51 |
| 6-10 | 0 | 82 |
| 9-10 | 0 | 38 |
| 6-11 | 0 | 40 |

**NOTES:**

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1)), consist of the sum of:

- benzo(a) anthracene
- benzo(a)pyrene
- benzo(b)flouranthene
- chrysene
- dibenz(a,h)anthracene
- indeno(1,2,3-cd)pyrene
- quinoline*
- benzo(j)fluoranthene**
- benzo(g,h,i)perylene

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included with the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo(j)fluoranthene can not be consistently separated by the laboratory. Therefore if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAHs (as listed in the CD/RAP (A.1.2), consists of the sum of:

- acenapthene
- acenaphthylene
- acridine
- anthracene
- benzo(k)fluoranthene
- 2,3-benzofuran
- benzo(e)pyrene
- benzo(b)thiophene
- biphenyl
- carbazole
- dibenzofuran
- 2,3-dihydroindene
- fluoranthene
- fluorene
- indene
- indole
- 1-methylnaphthalene
- 2-methylnaphthalene
- naphthalene
- perylene
- phenanthrene
- pyrene

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit.

**Table 4**
**Historical Summary of Other PAH and**
**CPAH Analytical Results for St. Peter Aquifer Wells**
**1988 Through 2011**

All concentrations reported in nanograms per liter (ng/l)

| W122 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 21 | 142 |
| 10-88 | 0 | 2,246 |
| 6-89 | 20 | 965 |
| 10-89 | 15 | 114 |
| 4-91 | 36 | 757 |
| 8-91 | 10 | 853 |
| 6-92 | 43 | 568 |
| 11-92 | 7 | 179 |
| 4-93 | 32 | 308 |
| 7-93 | 24 | 330 |
| 5-94 | 23 | 583 |
| 10-94 | 10 | 374 |
| 5-95 | 0 | 281 |
| 10-95 | 11 | 220 |
| 6-96 | 0 | 144 |
| 10-96 | 0 | 235 |
| 4-97 | 0 | 256 |
| 10-97 | 0 | 243 |
| 4-98 | 7 | 370 |
| 9-98 | 0 | 99 |
| 5-99 | 0 | 71 |
| 8-99 | 7 | 46 |
| 5-00 | 39 | 65 |
| 9-00 | 6 | 142 |
| 5-01 | 0 | 92 |
| 8-01 | 0 | 24 |
| 5-02 | 0 | 92 |
| 9-02 | 5 | 73 |
| 5-03 | 29 | 73 |
| 8-03 | 6 | 134 |
| 5-04 | 100 | 69 |
| 8-04 | 1 | 79 |
| 5-05 | 78 | 88 |
| 9-05 | 6 | 78 |
| 5-06 | 8 | 63 |
| 8-06 | 1 | 88 |
| 5-07 | 13 | 79 |
| 8-07 | 9 | 54 |
| 5-08 | 11 | 104 |
| 8-08 | 0 | 95 |
| 5-09 | 0 | 329 |
| 8-09 | 2 | 194 |
| 6-10 | 4 | 282 |
| 9-10 | 5 | 243 |
| 6-11 | 6 | 22 |

| W129 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 | 88 |
| 10-88 | 0 | 290 |
| 6-89 | 0 | 27 |
| 10-89 | 0 | 43 |
| 6-90 | 0 | 143 |
| 8-90 | 0 | 96 |
| 4-91 | 27 | 159 |
| 8-91 | 0 | 430 |
| 6-92 | 47 | 247 |
| 11-92 | 5 | 296 |
| 4-93 | 15 | 121 |
| 7-93 | 2 | 53 |
| 5-94 | 0 | 171 |
| 11-94 | 2 | 110 |
| 5-95 | 12 | 94 |
| 10-95 | 0 | 55 |
| 6-96 | 0 | 53 |
| 10-96 | 0 | 75 |
| 4-97 | 0 | 104 |
| 10-97 | 0 | 181 |
| 4-98 | 9 | 88 |
| 9-98 | 0 | 8 |
| 5-99 | 1 | 79 |
| 8-99 | 0 | 80 |
| 5-00 | 26 | 223 |
| 9-00 | 8 | 150 |
| 6-11 | 22 | 535 |

| W33R | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 5-07/8-07 | 14 | 778 |
| 5-08 | 2 | 497 |
| 8-08 | 15 | 182 |
| 5-09 | 45 | 883 |
| 8-09 | 11 | 109 |
| 6-10 | 14 | 122 |
| 9-10 | 31 | 96 |
| 6-11 | 0 | 27 |

| W133 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 | 52,370 |
| 10-88 | 0 | 29,830 |
| 6-89 | 0 | 37,870 |
| 10-89 | 0 | 21,099 |
| 6-90 | 0 | 19,448 |
| 8-90 | 0 | 14,030 |
| 4-91 | 5 | 2,587 |
| 8-91 | 0 | 4,610 |
| 6-92 | 0 | 2,453 |
| 11-92 | 0 | 1,920 |
| 4-93 | 0 | 1,134 |
| 7-93 | 0 | 836 |
| 5-94 | 5 | 665 |
| 10-94 | 0 | 434 |
| 5-95 | 0 | 165 |
| 10-95 | 0 | 157 |
| 5-96 | 0 | 142 |
| 10-96 | 0 | 285 |
| 4-97 | 0 | 241 |
| 10-97 | 0 | 108 |
| 4-98 | 0 | 88 |
| 9-98 | 0 | 299 |
| 4-99 | 7 | 633 |
| 9-99 | 0 | 190 |
| 5-00 | 0 | 167 |
| 9-00 | 0 | 327 |
| 5-01 | 0 | 156 |
| 8-01 | 0 | 40 |
| 5-02 | 0 | 904 |
| 9-02 | 0 | 338 |
| 5-03 | 6 | 114 |
| 8-03 | 11 | 411 |
| 5-04 | 0 | 905 |
| 8-04 | 84 | 186 |
| 5-05 | 50 | 1,617 |
| 9-05 | 9 | 434 |
| 5-06 | 15 | 1,988 |
| 8-06 | 0 | 463 |
| 5-07 | 0 | 552 |
| 8-07 | 14 | 730 |
| 5-08 | 23 | 182 |
| 8-08 | 0 | 567 |
| 5-09 | 0 | 856 |
| 8-09 | 2 | 343 |
| 6-10 | 6 | 514 |
| 9-10 | 27 | 217 |

**Table 4**
**Historical Summary of Other PAH and**
**CPAH Analytical Results for St. Peter Aquifer Wells**
**1988 Through 2011**

All concentrations reported in nanograms per liter (ng/l)

| W408 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 2 | 151 |
| 10-88 | 0 | 34 |
| 6-89 | 5 | 145 |
| 10-89 | 0 | 110 |
| 6-90 | 0 | 24 |
| 8-90 | 28 | 130 |
| 4-91 | 13 | 343 |
| 8-91 | 25 | 1,163 |
| 6-92 | 32 | 283 |
| 11-92 | 2 | 172 |
| 4-93 | 4 | 150 |
| 7-93 | 6 | 217 |
| 5-94 | 5 | 70 |
| 11-94 | 0 | 170 |
| 5-95 | 9 | 143 |
| 10-95 | 15 | 135 |
| 6-96 | 0 | 66 |
| 10-96 | 0 | 103 |
| 4-97 | 0 | 169 |
| 10-97 | 0 | 166 |
| 4-98 | 1 | 96 |
| 9-98 | 0 | 62 |
| 5-99 | 0 | 64 |
| 8-99 | 2 | 51 |
| 5-00 | 89 | 103 |
| 9-00 | 0 | 53 |
| 6-11 | 2 | 41 |

| W414 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 6-11 | 4 | 47 |

| W409 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 159 | 2,198 |
| 10-88 | 0 | 890 |
| 6-89 | 53 | 571 |
| 10-89 | 0 | 830 |
| 6-90 | 0 | 141 |
| 8-90 | 43 | 200 |
| 4-91 | 0 | 360 |
| 8-91 | 0 | 3,833 |
| 6-92 | 0 | 49,660 |
| 11-92 | 0 | 49,399 |
| 4-93 | 0 | 50,060 |
| 7-93 | 0 | 42,440 |
| 5-95 | 0 | 173,000 |
| 10-95 | 0 | 167,000 |
| 4-96 | 0 | 805,420 |
| 10-96 | 0 | 312,500 |
| 5-97 | 0 | 157,000 |
| 9-97 | 0 | 64,000 |
| 5-98 | 0 | 159,200 |
| 9-98 | 0 | 107,700 |
| 4-99 | 0 | 446,860 |
| 8-99 | 0 | 342,000 |
| 5-00 | 0 | 1,196,900 |
| 9-00 | 620 | 468,710 |
| 5-01 | 0 | 269,800 |
| 8-01 | 0 | 228,300 |
| 5-02 | 0 | 324,300 |
| 9-02 | 0 | 135,200 |
| 5-03 | 0 | 170,600 |
| 8-03 | 0 | 213,700 |
| 5-04 | 0 | 152,200 |
| 8-04 | 0 | 125,800 |
| 5-05 | 0 | 148,300 |
| 9-05 | 0 | 91,300 |
| 5-06 | 0 | 48,480 |
| 8-06 | 0 | 33,000 |
| 5-07 | 0 | 28,800 |
| 8-07 | 0 | 18,170 |
| 5-08 | 0 | 28,200 |
| 8-08 | 0 | 35,900 |
| 5-09 | 0 | 1,600 |
| 8-09 | 0 | 29,000 |
| 6-10 | 0 | 18,170 |
| 9-10 | 0 | 8,623 |
| 6-11 | 0 | 15,289 |

| W410 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 | 1,288 |
| 10-88 | 0 | 1,435 |
| 6-89 | 5 | 424 |
| 10-89 | 0 | 357 |
| 4-91 | 0 | 85 |
| 8-91 | 0 | 5,330 |
| 2-92 | 0 | 14,070 |
| 6-92 | 0 | 12,850 |
| 11-92 | 0 | 16,470 |
| 4-93 | 0 | 17,600 |
| 7-93 | 0 | 16,609 |
| 5-94 | 0 | 14,505 |
| 10-94 | 0 | 20,880 |
| 5-95 | 0 | 21,640 |
| 10-95 | 0 | 13,940 |
| 5-96 | 0 | 15,970 |
| 10-96 | 0 | 14,170 |
| 4-97 | 0 | 14,690 |
| 10-97 | 0 | 10,150 |
| 4-98 | 0 | 8,620 |
| 5-98 | 0 | 1,900 |
| 9-98 | 0 | 9,690 |
| 11-98 | 0 | 5,942 |
| 3-99 | 0 | 8,780 |
| 4-99 | 0 | 21,606 |
| 9-99 | 0 | 8,780 |
| 11-99 | 0 | 3,800 |
| 2-00 | 0 | 4,750 |
| 5-00 | 0 | 6,502 |
| 9-00 | 0 | 6,269 |
| 12-00 | 0 | 1,500 |
| 3-01 | 0 | 2,940 |
| 5-01 | 0 | 6,217 |
| 9-01 | 0 | 2,854 |
| 3-02 | 0 | 2,090 |
| 6-02 | 0 | 2,142 |
| 9-02 | 0 | 3,327 |
| 6-03 | 0 | 4,593 |
| 9-03 | 0 | 4,332 |
| 5-04 | 0 | 4,489 |
| 8-04 | 0 | 7,086 |
| 5-05 | 0 | 7,701 |
| 9-05 | 0 | 10,553 |
| 5-06 | 0 | 9,545 |
| 8-06 | 0 | 8,359 |
| 5-07 | 0 | 17,690 |
| 5-09 | 0 | 32,718 |
| 8-09 | 0 | 61,812 |
| 6-10 | 0 | 53,603 |
| 9-10 | 0 | 62,470 |
| 6-11 | 0 | 82,505 |

**Table 4**
**Historical Summary of Other PAH and**
**CPAH Analytical Results for St. Peter Aquifer Wells**
**1988 Through 2011**

All concentrations reported in nanograms per liter (ng/l)

| W411 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 0 | 1,274 |
| 10-88 | 0 | 1,161 |
| 6-89 | 8 | 200 |
| 10-89 | 0 | 460 |
| 6-90 | 15 | 451 |
| 8-90 | 0 | 336 |
| 4-91 | 12 | 384 |
| 8-91 | 0 | 251 |
| 6-92 | 24 | 313 |
| 11-92 | 1 | 181 |
| 4-93 | 7 | 189 |
| 7-93 | 5 | 113 |
| 5-94 | 3 | 120 |
| 11-94 | 6 | 219 |
| 5-95 | 6 | 235 |
| 10-95 | 1 | 183 |
| 6-96 | 0 | 79 |
| 10-96 | 0 | 253 |
| 4-97 | 0 | 82 |
| 10-97 | 3 | 253 |
| 4-98 | 1 | 120 |
| 9-98 | 61 | 424 |
| 5-99 | 0 | 99 |
| 8-99 | 0 | 79 |
| 5-00 | 0 | 56 |
| 9-00 | 17 | 138 |
| 5-01 | 0 | 124 |
| 8-01 | 0 | 46 |
| 5-02 | 0 | 34 |
| 9-02 | 0 | 16 |
| 5-03 | 38 | 113 |
| 8-03 | 0 | 57 |
| 5-04 | 97 | 107 |
| 8-04 | 0 | 90 |
| 5-05 | 43 | 75 |
| 9-05 | 3 | 76 |
| 5-06 | 1 | 56 |
| 8-06 | 0 | 68 |
| 5-07 | 4 | 84 |
| 8-07 | 1 | 93 |
| 5-08 | 0 | 84 |
| 8-08 | 0 | 95 |
| 5-09 | 0 | 114 |
| 8-09 | 0 | 22 |
| 6-10 | 2 | 183 |
| 9-10 | 0 | 197 |
| 6-11 | 0 | 26 |

| W412 | | |
|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] |
| 7-88 | 8 | 1,309 |
| 10-88 | 0 | 209 |
| 6-89 | 18 | 211 |
| 10-89 | 0 | 132 |
| 8-90 | 1 | 484 |
| 4-91 | 48 | 1,470 |
| 8-91 | 0 | 5,283 |
| 6-92 | 12 | 1,319 |
| 11-92 | 0 | 3,796 |
| 4-93 | 154 | 842 |
| 7-93 | 16 | 777 |
| 5-94 | 25 | 291 |
| 10-94 | 10 | 538 |
| 5-95 | 18 | 369 |
| 10-95 | 0 | 402 |
| 5-96 | 0 | 139 |
| 10-96 | 0 | 1,620 |
| 4-97 | 0 | 806 |
| 10-97 | 0 | 614 |
| 4-98 | 30 | 260 |
| 9-98 | 60 | 557 |
| 4-99 | 20 | 267 |
| 9-99 | 0 | 764 |
| 5-00 | 250 | 105 |
| 9-00 | 1 | 164 |
| 5-01 | 4 | 363 |
| 8-01 | 0 | 1125 |
| 5-02 | 10 | 243 |
| 9-02 | 3 | 135 |
| 5-03 | 12 | 82 |
| 8-03 | 15 | 130 |
| 5-04 | 84 | 129 |
| 8-04 | 11 | 236 |
| 5-05 | 85 | 132 |
| 9-05 | 3 | 115 |
| 5-06 | 21 | 118 |
| 8-06 | 9 | 246 |
| 5-07 | 3 | 54 |
| 8-07 | 2 | 255 |
| 5-08 | 15 | 297 |
| 8-08 | 0 | 710 |
| 5-09 | 0 | 530 |
| 8-09 | 0 | 450 |
| 6-10 | 0 | 207 |
| 9-10 | 0 | 10 |
| 6-11 | 21 | 72 |

**Table 5**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Platteville Aquifer Wells**

PAH and Phenolic concentrations in micrograms per liter (ug/l)

**W18**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 [3] | 0 | 20 |
| 10-88 | 0 | 361 | 20 |
| 6-89 | 0 | 39 | 44 |
| 2-92 | 0 | 10 | 8 |
| 5-96 | 0 | 2 | NA |
| 9-96 | 0 | 2 | NA |
| 4-97 | 0 | 1 | NA |
| 9-97 | 0 | 1 | NA |
| 5-98 | 0 | 1 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 1 | NA |
| 9-99 | 0 | 1 | NA |
| 5-00 | 0 | 1 | NA |
| 9-00 | 0 | 1 | NA |
| 9-11 | 0 | 8 | NA |

**W20**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 28 |
| 10-88 | 0 | 3 | 16 |
| 6-89 | 0 | 6 | 34 |
| 5-90 | 0 | 7 | 9 |
| 5-94 | 0 | 1 | 0 |
| 5-96 | 0 | 1 | NA |
| 9-96 | 0 | 1 | NA |
| 4-97 | 0 | 2 | NA |
| 10-97 | 0 | 2 | NA |
| 5-98 | 0 | 1 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 1 | NA |
| 9-99 | 0 | 1 | NA |
| 5-00 | 0 | 1 | NA |
| 9-00 | 0 | 1 | NA |
| 5-01 | 0 | 0 | NA |
| 8-01[4] | 0 | 0 | NA |
| 5-02 | 0 | 0 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 6 | NA |
| 8-03 | 0 | 5 | NA |
| 5-04 | 0 | 2 | NA |
| 8-04 | 0 | 0 | NA |
| 5-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 4 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |

**W22**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 5-90 | 0 | 0 | 0 |
| 2-92 | 0 | 1 | 0 |
| 3-92 | 0 | 5 | NA |
| 5-96 | 0 | 0 | NA |
| 9-96 | 0 | 0 | NA |
| 4-97 | 0 | 2 | NA |
| 9-97 | 0 | 2 | NA |
| 4-98 | 0 | 1 | NA |
| 9-98 | 0 | 8 | NA |
| 4-99 | 0 | 22 | NA |
| 9-99 | 0 | 24 | NA |
| 5-00 | 0 | 3 | NA |
| 9-00 | 0 | 42 | NA |
| 6-11 | 0 | 0 | NA |

**W27**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 10-88 | 0 | 1,882 | NA |
| 6-89 | 0 | 1,345 | NA |
| 5-96 | 0 | 1 | NA |
| 10-96 | 0 | 9 | NA |
| 4-97 | 0 | 281 | NA |
| 9-97 | 0 | 416 | NA |
| 4-98 | 0 | 184 | NA |
| 9-98 | 0 | 422 | NA |
| 4-99 | 0 | 312 | NA |
| 8-99 | 0 | 158 | NA |
| 5-00 | 0 | 415 | NA |
| 9-00 | 0 | 243 | NA |
| 5-01 | 0 | 199 | NA |
| 8-01[4] | 0 | 99 | NA |
| 5-02 | 0 | 123 | NA |
| 9-02 | 0 | 193 | NA |
| 5-03 | 0 | 89 | NA |
| 8-03 | 0 | 85 | NA |
| 5-04 | 0 | 196 | NA |
| 8-04 | 0 | 116 | NA |
| 5-05 | 0 | 143 | NA |
| 9-05 | 0 | 106 | NA |
| 5-06 | 0 | 133 | NA |
| 8-06 | 0 | 118 | NA |
| 5-07 | 0 | 77 | NA |
| 8-07 | 0 | 97 | NA |
| 5-08 | 0 | 48 | NA |
| 8-08 | 0 | 109 | NA |
| 5-09 | 0 | 76 | NA |
| 8-09 | 0 | 121 | NA |
| 6-10 | 0 | 54 | NA |
| 9-10 | 1 | 69 | NA |
| 6-11 | 0 | 79 | NA |

**W101**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 4 | 7 |
| 10-88 | 0 | 23 | 0 |
| 6-89 | 0 | 48 | 20 |
| 5-90 | 0 | 22 | 0 |
| 2-92 | 0 | 18 | 6 |
| 5-94 | 0 | 11 | 0 |
| 5-96 | 0 | 5 | NA |
| 10-96 | 0 | 32 | NA |
| 4-97 | 0 | 31 | NA |
| 9-97 | 0 | 15 | NA |
| 4-98 | 0 | 17 | NA |
| 9-98 | 0 | 125 | NA |
| 4-99 | 0 | 32 | NA |
| 9-99 | 0 | 24 | NA |
| 5-00 | 0 | 41 | NA |
| 9-00 | 0 | 32 | NA |
| 4-01 | 0 | 18 | NA |
| 9-01[4] | 0 | 12 | NA |
| 5-02 | 0 | 17 | NA |
| 9-02 | 0 | 6 | NA |
| 5-03 | 0 | 14 | NA |
| 8-03 | 0 | 3 | NA |
| 5-04 | 0 | 19 | NA |
| 8-04 | 0 | 3 | NA |
| 5-05 | 0 | 3 | NA |
| 9-05 | 0 | 2 | NA |
| 5-06 | 0 | 2 | NA |
| 8-06 | 0 | 3 | NA |
| 5-07 | 0 | 8 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 10 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**W121**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 73 |
| 10-88 | 0 | 0 | 35 |
| 6-89 | 0 | 0 | 35 |
| 5-90 | 0 | 0 | 0 |
| 5-94 | 0 | 0 | 0 |
| 5-96 | 0 | 0 | NA |
| 10-96 | 0 | 0 | NA |
| 4-97 | 0 | 0 | NA |
| 10-97 | 0 | 0 | NA |
| 5-98 | 0 | 0 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 0 | NA |
| 9-99 | 0 | 0 | NA |
| 5-00 | 0 | 0 | NA |
| 9-00 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**Table 5**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Platteville Aquifer Wells**

PAH and Phenolic concentrations in micrograms per liter (ug/l)

**W120**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 35 | 44 |
| 10-88 | 0 | 41 | 57 |
| 6-89 | 0 | 76 | 48 |
| 5-96 | 0 | 2 | NA |
| 10-96 | 0 | 11 | NA |
| 4-97 | 0 | 12 | NA |
| 9-97 | 0 | 6 | NA |
| 4-98 | 0 | 2 | NA |
| 9-98 | 0 | 4 | NA |
| 4-99 | 0 | 3 | NA |
| 9-99 | 0 | 2 | NA |
| 5-00 | 0 | 2 | NA |
| 9-00 | 0 | 2 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |

**W131**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 0 |
| 10-88 | 0 | 0 | 13 |
| 6-89 | 0 | 0 | 0 |
| 2-92 | 0 | 13 | 0 |
| 5-94 | 0 | 0 | 0 |
| 5-96 | 0 | 0 | NA |
| 10-96 | 0 | 0 | NA |
| 4-97 | 0 | 0 | NA |
| 10-97 | 0 | 0 | NA |
| 5-98 | 0 | 0 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 0 | NA |
| 9-99 | 0 | 0 | NA |
| 5-00 | 0 | 0 | NA |
| 5-01 | 0 | 0 | NA |
| 8-01[4] | 0 | 0 | NA |
| 5-02 | 0 | 0 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 5-04 | 0 | 2 | NA |
| 8-04 | 0 | 3 | NA |
| 5-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 2 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**W130**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 0 |
| 10-88 | 0 | 0 | 0 |
| 6-89 | 0 | 0 | 0 |
| 5-90 | 0 | 0 | 0 |
| 5-96 | 0 | 0 | NA |
| 10-96 | 0 | 0 | NA |
| 4-97 | 0 | 0 | NA |
| 10-97 | 0 | 0 | NA |
| 5-98 | 0 | 0 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 0 | NA |
| 9-99 | 0 | 0 | NA |
| 5-00 | 0 | 0 | NA |
| 9-00 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |

**W143**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 0 |
| 10-88 | 0 | 0 | 0 |
| 6-89 | 0 | 1 | 33 |
| 5-96 | 0 | 1 | NA |
| 10-96 | 0 | 1 | NA |
| 4-97 | 0 | 9 | NA |
| 9-97 | 0 | 1 | NA |
| 4-98 | 0 | 4 | NA |
| 9-98 | 0 | 10 | NA |
| 4-99 | 0 | 15 | NA |
| 9-99 | 0 | 4 | NA |
| 5-00 | 0 | 0 | NA |
| 5-01 | 0 | 5 | NA |
| 9-01[4] | 0 | 3 | NA |
| 5-02 | 0 | 10 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 5-04 | 0 | 0 | NA |
| 8-04 | 0 | 3 | NA |
| 5-05 | 0 | 6 | NA |
| 9-05 | 0 | 2 | NA |
| 5-06 | 0 | 14 | NA |
| 8-06 | 0 | 3 | NA |
| 5-07 | 0 | 3 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 2 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 8 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**W424**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 10 |
| 10-88 | 0 | 0. | 0 |
| 6-89 | 0 | 1 | 17 |
| 5-90 | 0 | 0 | 0 |
| 2-92 | 0 | 5 | 0 |
| 3-92 | 0 | 11 | 0 |
| 5-94 | 0 | 0 | 0 |
| 5-96 | 0 | 0 | NA |
| 10-96 | 0 | 0 | NA |
| 4-97 | 0 | 0 | NA |
| 9-97 | 0 | 0 | NA |
| 5-98 | 0 | 0 | NA |
| 9-98 | 0 | 0 | NA |
| 5-99 | 0 | 0 | NA |
| 9-99 | 0 | 0 | NA |
| 5-00 | 0 | 0 | NA |
| 9-00 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |

**W426**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 1 | 905 | 25 |
| 10-88 | 0 | 639 | 35 |
| 6-89 | 0 | 498 | 80 |
| 2-92 | 0 | 82 | 15 |
| 3-92 | 0 | 47 | NA |
| 5-96 | 0 | 55 | NA |
| 4-97 | 0 | 76 | NA |
| 9-97 | 0 | 64 | NA |
| 4-98 | 0 | 108 | NA |
| 9-98 | 0 | 1,508 | NA |
| 4-99 | 0 | 642 | NA |
| 8-99 | 0 | 258 | NA |
| 5-00 | 0 | 112 | NA |
| 9-00 | 0 | 160 | NA |
| 5-01 | 0 | 131 | NA |
| 8-01[4] | 0 | 32 | NA |
| 5-02 | 0 | 564 | NA |
| 9-02 | 0 | 271 | NA |
| 5-03 | 0 | 574 | NA |
| 8-03 | 0 | 289 | NA |
| 5-04 | 0 | 636 | NA |
| 8-04 | 0 | 218 | NA |
| 5-05 | 0 | 601 | NA |
| 9-05 | 0 | 415 | NA |
| 5-06 | 0 | 259 | NA |
| 8-06 | 0 | 262 | NA |
| 5-07 | 0 | 301 | NA |
| 8-07 | 0 | 144 | NA |
| 5-08 | 0 | 147 | NA |
| 8-08 | 0 | 267 | NA |
| 5-09 | 0 | 141 | NA |
| 8-09 | 0 | 116 | NA |
| 6-10 | 0 | 92 | NA |
| 9-10 | 0 | 37 | NA |
| 6-11 | 0 | 121 | NA |

**Table 5**
**Historical Summary of Other PAH, CPAH, and**
**Phenolic Analytical Results**
**1988 Through 2011**

**Platteville Aquifer Wells**

PAH and Phenolic concentrations in micrograms per liter (ug/l)

| W421 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 1st Quarter | 0 | 566 | 33 |
| 2nd Quarter | 0 | 821 | 0 |
| 8-88 | 0 | 764 | 30 |
| 10-88 | 0 | 1,107 | 35 |
| 3-89 | 0 | 878 | 29 |
| 6-89 | 0 | 1,000 | 26 |
| 9-89 | 0 | 1,000 | 33 |
| 12-89 | 0 | 730 | 27 |
| 3-90 | 0 | 1,420 | 33 |
| 5-90 | 0 | 715 | 29 |
| 8-90 | 0 | 1,410 | 36 |
| 12-90 | 0 | 1,145 | 29 |
| 3-91 | 0 | 1,449 | 30 |
| 6-91 | 10 | 1,389 | 31 |
| 9-91 | 0 | 1,226 | 27 |
| 10-91 | 0 | 1,285 | 30 |
| 2-92 | 0 | 988 | 31 |
| 6-92 | 0 | 1,163 | 26 |
| 9-92 | 0 | 1,547 | 28 |
| 10-92 | 0 | 1,299 | 45 |
| 3-93 | 0 | 1,332 | 15 |
| 4-93 | 0 | 1,184 | 21 |
| 8-93 | 0 | 1,025 | 32 |
| 11-93 | 0 | 1,017 | 29 |
| 2-94 | 0 | 1,045 | 14 |
| 6-94 | 0 | 939 | 17 |
| 8-94 | 0 | 788 | 31 |
| 10-94 | 0 | 966 | 24 |
| 3-95 | 0 | 949 | 31 |
| 5-95 | 0 | 911 | 19 |
| 9-95 | 0 | 966 | 29 |
| 10-95 | 0 | 764 | 20 |
| 2-96 | 0 | 618 | 28 |
| 4-96 | 0 | 630 | 123 |
| 7-96 | 0 | 884 | 24 |
| 10-96 | 0 | 843 | 24 |
| 2-97 | 0 | 709 | 26 |
| 5-97 | 0 | 741 | 27 |
| 9-97 | 0 | 699 | 25 |
| 1-98 | 0 | 787 | 26 |
| 2-98 | 0 | 915 | 20 |
| 5-98 | 0 | 684 | 21 |
| 9-98 | 0 | 306 | 5 |
| 11-98 | 0 | 518 | 26 |
| 3-99 | 0 | 393 | 21 |
| 4-99 | 0 | 611 | 21 |
| 8-99 | 0 | 389 | 25 |
| 11-99 | 0 | 479 | 12 |
| 2-00 | 0 | 462 | 23 |
| 5-00 | 0 | 626 | 24 |
| 9-00 | 44 | 1,022 | 19 |
| 12-00 | 0 | 376 | 18 |
| 3-01 | 8 | 341 | 21 |
| 5-01 | 7 | 717 | 29 |
| 8-01 | 31 | 415 | 23 |
| 10-01 | 36 | 266 | 27 |
| 3-02 | 6 | 557 | 7 |
| 5-02 | 3 | 410 | NA |
| 9-02 | 0 | 551 | NA |
| 10-02 | 5 | 530 | NA |
| 3-03 | 430 | 1,302 | NA |
| 5-03 | 310 | 2,112 | NA |
| 8-03 | 5 | 545 | NA |
| 11-03 | 715 | 4,396 | NA |
| 3-04 | 23 | 675 | NA |
| 4-04 | 0 | 619 | NA |
| 8-04 | 13 | 780 | NA |
| 11-04 | 18 | 995 | NA |
| 3-05 | 8 | 532 | NA |

| W421 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 5-05 | 0 | 518 | NA |
| 9-05 | 0 | 533 | NA |
| 11-05 | 6 | 407 | NA |
| 3-06 | 0 | 645 | NA |
| 5-06 | 0 | 539 | NA |
| 8-06 | 2 | 577 | NA |
| 11-06 | 2 | 596 | NA |
| 3-07 | 36 | 655 | NA |
| 5-07 | 9 | 608 | NA |
| 8-07 | 22 | 797 | NA |
| 11-07 | 7 | 682 | NA |
| 3-08 | 106 | 868 | NA |
| 4-08 | 38 | 648 | NA |
| 5-09 | 14 | 525 | NA |
| 8-09 | 140 | 1,307 | NA |
| 11-09 | 171 | 1,731 | NA |
| 3-10 | 360 | 3,048 | NA |
| 6-10 | 111 | 818 | NA |
| 9-10 | 260 | 1,635 | NA |
| 12-10 | 74 | 993 | NA |
| 3-11 | 65 | 737 | NA |
| 6-11 | 6 | 606 | NA |
| 9-11 | 181 | 2,131 | NA |
| 12-11 | 392 | 2,822 | NA |

| W434 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 2-92 | 0 | 4 | 9 |
| 10-96 | 0 | 4 | NA |
| 4-97 | 0 | 7 | NA |
| 9-97[4] | 0 | 5 | 8 |
| 10-97 | 0 | 3 | NA |
| 1-98 | 0 | 4 | 0 |
| 2-98 | 0 | 3 | 5 |
| 5-98 | 0 | 3 | 5 |
| 9-98 | 0 | 73 | 0 |
| 11-98 | 0 | 12 | 0 |
| 3-99 | 0 | 14 | 0 |
| 4-99 | 0 | 1 | 0 |
| 8-99 | 0 | 1 | 6 |
| 11-99 | 0 | 1 | 0 |
| 2-00 | 0 | 2 | 0 |
| 5-00 | 0 | 5 | 3 |
| 9-00 | 0.3 | 4 | 0 |
| 12-00 | 0 | 1 | 0 |
| 3-01 | 0 | 3 | 5 |
| 5-01 | 0 | 6 | 6 |
| 9-01 | 0 | 4 | NA |
| 10-01 | 0 | 4 | 5 |
| 3-02 | 0 | 5 | 25 |
| 5-02 | 0 | 5 | NA |
| 9-02 | 0 | 5 | NA |
| 5-03 | 0 | 4 | NA |
| 8-03 | 0 | 3 | NA |
| 5-04 | 0 | 6 | NA |
| 8-04 | 0 | 3 | NA |
| 5-05 | 0 | 3 | NA |
| 9-05 | 0 | 3 | NA |
| 5-06 | 0 | 3 | NA |
| 8-06 | 0 | 3 | NA |
| 5-07 | 0 | 2 | NA |
| 8-07 | 0 | 2 | NA |
| 5-08 | 0 | 2 | NA |
| 8-08 | 0 | 2 | NA |
| 5-09 | 0 | 0 | NA |
| 6-10 | 0 | 2 | NA |
| 9-10 | 0 | 1 | NA |
| 9-11 | 0 | 1 | NA |

**Table 5**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Platteville Aquifer Wells**

PAH and Phenolic concentrations in micrograms per liter (ug/l)

| W428 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 8-88 | 0 | 0 | 0 |
| 10-88 | 0 | 1 | 8 |
| 6-89 | 0 | 1 | 16 |
| 5-90 | 0 | 0 | 0 |
| 2-92 | 0 | 2 | 6 |
| 3-92 | 0 | 9 | NA |
| 5-94 | 0 | 0 | 0 |
| 5-96 | 0 | 0 | NA |
| 10-96 | 0 | 0 | NA |
| 4-97 | 0 | 0 | NA |
| 5-98 | 0 | 0 | NA |
| 9-98 | 0 | 1 | NA |
| 5-99 | 0 | 1 | NA |
| 9-99 | 0 | 0 | NA |
| 5-00 | 0 | 2 | NA |
| 9-00 | 0 | 1 | NA |
| 5-01 | 0 | 2 | NA |
| 8-01[4] | 0 | 0 | NA |
| 5-02 | 0 | 0 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 5-04 | 0 | 0 | NA |
| 8-04 | 0 | 0 | NA |
| 5-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

| W437 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 2-92 | 0 | 3,096 | 20 |
| 3-92 | 0 | 489 | NA |
| 5-01 | 0 | 6,305 | NA |
| 8-01[4] | 0 | 5,342 | NA |
| 5-02 | 0 | 5,438 | NA |
| 9-02 | 0 | 5,292 | NA |
| 5-03 | 0 | 1,116 | NA |
| 8-03 | 0 | 5,977 | NA |
| 5-04 | 0 | 6,265 | NA |
| 8-04 | 0 | 4,553 | NA |
| 5-05 | 0 | 4,749 | NA |
| 9-05 | 0 | 5,802 | NA |
| 5-06 | 0 | 4,241 | NA |
| 8-06 | 0 | 5,443 | NA |
| 5-07 | 0 | 3,699 | NA |
| 8-07 | 0 | 3,703 | NA |
| 5-08 | 0 | 2,667 | NA |
| 8-08 | 0 | 3,520 | NA |
| 5-09 | 0 | 2,507 | NA |
| 8-09 | 0 | 2,868 | NA |
| 6-10 | 0 | 1,248 | NA |
| 9-10 | 0 | 1,515 | NA |
| 6-11 | 0 | 907 | NA |

| W438 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 2-92 | 0 | 20 | 5 |
| 3-92 | 0 | 0 | NA |
| 5-01 | 1 | 1 | NA |
| 9-01[4] | 1 | 1 | NA |
| 5-02 | 0 | 5 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 5-04 | 0 | 0 | NA |
| 8-04 | 0 | 0 | NA |
| 5-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 5-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |

**NOTES:**

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1)), consist of the sum of:

benzo(a) anthracene
benzo(a)pyrene
benzo(b)flouranthene
chrysene
dibenz(a,h)anthracene
indeno(1,2,3-cd)pyrene
quinoline*
benzo(j)fluoranthene**
benzo(g,h,i)perylene

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included in the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo(j)fluoranthene can not be consistently separated by the laboratory. Therefore if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAHs (as listed in the CD/RAP (A.1.2), consists of the sum of:

acenapthene
acenaphthylene
acridine
anthracene
benzo(k)fluoranthene
2,3-benzofuran
benzo(e)pyrene
benzo(b)thiophene
biphenyl
carbazole
dibenzofuran
dibenzothiophene
2,3-dihydroindene
fluoranthene
fluorene
indene
indole
1-methylnaphthalene
2-methylnaphthalene
naphthalene
perylene
phenanthrene
pyrene

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit, or were below 0.5 ug/l.

[4] For this report, the analytical results prior to 2002 have been rounded to the nearest part per billion.

NA = Not analyzed for identified compound class.

**Table 6**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Drift Aquifer Wells**

All concentrations in micrograms per liter (ug/l).

| P109 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 8-88 | 0 [3] | 3 | 8 |
| 10-88 | 0 | 4 | 0 |
| 6-89 | 0 | 4 | 15.5 |
| 5-90 | 0 | 5 | 0 |
| 4-01 | 0 | 1 | NA |
| 9-01[4] | 0 | 0 | NA |
| 5-02 | 0 | 0 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 4-04 | 0 | 0 | NA |
| 8-04 | 0 | 0 | NA |
| 4-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 4-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |

| P307 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 4-91 | 0 | 226 | 18.5 |
| 8-01[4] | 0 | 76 | NA |
| 5-02 | 0 | 42 | NA |
| 9-02 | 0 | 89 | NA |
| 5-03 | 0 | 42 | NA |
| 8-03 | 0 | 60 | NA |
| 4-04 | 0 | 52 | NA |
| 8-04 | 0 | 68 | NA |
| 4-05 | 0 | 110 | NA |
| 9-05 | 0 | 122 | NA |
| 5-06 | 0 | 27 | NA |
| 8-06 | 0 | 140 | NA |
| 5-07 | 0 | 97 | NA |
| 8-07 | 0 | 78 | NA |
| 4-08 | 0 | 63 | NA |
| 8-08 | 0 | 41 | NA |
| 5-09 | 0 | 43 | NA |
| 8-09 | 0 | 46 | NA |
| 6-10 | 0 | 16 | NA |
| 9-10 | 0 | 15 | NA |
| 6-11 | 0 | 14 | NA |

| P308 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 4-91 | 0 | 98 | 10.5 |
| 2-92 | 0 | 0 | 11.7 |
| 10-94 | 0 | 41 | NA |
| 5-01 | 0 | 2 | NA |
| 8-01[4] | 0 | 12 | NA |
| 5-02 | 0 | 3 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 4-04 | 0 | 0 | NA |
| 8-04 | 0 | 2 | NA |
| 4-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 5 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 9 | NA |
| 8-07 | 0 | 4 | NA |
| 4-08 | 0 | 1 | NA |
| 8-08 | 0 | 1 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 1 | NA |
| 9-10 | 0 | 4 | NA |
| 6-11 | 0 | 2 | NA |

[1] Total Carcinogenic PAHs (as listed in the CD/RAP (A.1.1)), consist of the sum of:

benzo(a) anthracene
benzo(a)pyrene
benzo(b)flouranthene
chrysene
dibenz(a,h)anthracene
indeno(1,2,3-cd)pyrene
quinoline*
benzo(j)fluoranthene**
benzo(g,h,i)perylene

*Quinoline is included in the sum of CPAH if other CPAHs were detected. If no CPAHs are detected, quinoline is included in the Total Other PAH.

**Benzo(j)fluoranthene will coelute with either benzo(b)fluoranthene or benzo(k)fluoranthene. Benzo(j)fluoranthene can not be consistently separated by the laboratory. Therefore if present, it will be reported as benzo(b)- and/or benzo(k)-fluoranthene.

[2] Total Other PAHs (as listed in the CD/RAP (A.1.2), consists of the sum of:

acenapthene
acenaphthylene
acridine
anthracene
benzo(k)fluoranthene
2,3-benzofuran
benzo(e)pyrene
benzo(b)thiophene
biphenyl
carbazole
dibenzofuran
dibenzothiophene
2,3-dihydroindene
fluoranthene
fluorene
indene
indole
1-methylnaphthalene
2-methylnaphthalene
naphthalene
perylene
phenanthrene
pyrene

[3] Result reported as 0 indicates that all parameters were not detected above the laboratory detection limit, or were below 0.5 ug/l.

[4] For this report, the analytical results prior to 2002 have been rounded to the nearest part per billion.

**Table 6**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Drift Aquifer Wells**

All concentrations in micrograms per liter (ug/l).

**P112**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | 0 |
| 10-88 | 0 | 0 | 8.6 |
| 6-89 | 0 | 0 | 35.7 |
| 5-90 | 0 | 0 | 0 |
| 2-92 | 0 | 0 | 0 |
| 5-01 | 0 | 0 | NA |
| 8-01[4] | 0 | 0 | NA |
| 5-02 | 0 | 0 | NA |
| 9-02 | 0 | 0 | NA |
| 5-03 | 0 | 0 | NA |
| 8-03 | 0 | 0 | NA |
| 4-04 | 0 | 0 | NA |
| 8-04 | 0 | 0 | NA |
| 4-05 | 0 | 0 | NA |
| 9-05 | 0 | 0 | NA |
| 5-06 | 0 | 0 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 0 | NA |
| 8-07 | 0 | 0 | NA |
| 4-08 | 0 | 0 | NA |
| 8-08 | 0 | 0 | NA |
| 5-09 | 0 | 0 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 0 | NA |
| 9-10 | 0 | 0 | NA |

**W2**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 8-88 | 0 | 0 | NA |
| 10-88 | 0 | 0 | NA |
| 6-89 | 0 | 0 | NA |
| 5-94 | 0 | 0 | NA |
| 6-11 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**W9**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 6-11 | 0 | 9 | NA |
| 9-11 | 0 | 11 | NA |

**W15**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 5-90 | 0 | 11 | NA |
| 2-92 | 1 | 8 | NA |
| 5-94 | 0 | 1 | NA |
| 6-11 | 0 | 0 | NA |
| 9-11 | 0 | 0 | NA |

**W439**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 3-95 | 0 | 3,933 | 91 |
| 5-95 | 0 | 4,053 | 74 |
| 9-95 | 0 | 2,564 | 54 |
| 10-95 | 0 | 2,115 | 50 |
| 2-96 | 0 | 1,552 | 46 |
| 4-96 | 0 | 1,419 | 43 |
| 7-96 | 0 | 1,765 | 43 |
| 10-96 | 0 | 1,557 | 45 |
| 2-97 | 0 | 1,277 | 43 |
| 5-97 | 0 | 1,683 | 48 |
| 9-97 | 0 | 1,547 | 42 |
| 1-98 | 0 | 1,236 | 34 |
| 2-98 | 0 | 1,377 | 31 |
| 5-98 | 0 | 1,221 | 35 |
| 9-98 | 0 | 978 | 12 |
| 11-98 | 0 | 954 | 53 |
| 3-99 | 0 | 1,385 | 29 |
| 4-99 | 0 | 1,278 | 31 |
| 8-99 | 0 | 755 | 45 |
| 11-99 | 0 | 1,123 | 17 |
| 2-00 | 0 | 1,081 | 31 |
| 5-00 | 0 | 1,975 | 31 |
| 9-00 | 0 | 1,859 | 26 |
| 12-00 | 0 | 1,187 | 37 |
| 3-01 | 0 | 1,498 | 34 |
| 5-01 | 0 | 1,623 | 37 |
| 8-01 | 0 | 1,056 | NA |
| 10-01 | 0 | 1,095 | 42 |
| 3-02 | 0 | 1,205 | 27 |
| 5-02 | 0 | 1,214 | NA |
| 9-02 | 0 | 1,027 | NA |
| 5-03 | 0 | 981 | NA |
| 8-03 | 0 | 1,535 | NA |
| 4-04 | 0 | 1,260 | NA |
| 8-04 | 0 | 1800 | NA |
| 4-05 | 0 | 1396 | NA |
| 9-05 | 0 | 1,303 | NA |
| 5-06 | 0 | 1,327 | NA |
| 8-06 | 0 | 1,015 | NA |
| 5-07 | 0 | 898 | NA |
| 8-07 | 0 | 963 | NA |
| 4-08 | 0 | 1,776 | NA |
| 5-09 | 0 | 1,144 | NA |
| 8-09 | 0 | 1,308 | NA |
| 6-10 | 0 | 904 | NA |
| 9-10 | 0 | 788 | NA |
| 6-11 | 0 | 1,002 | NA |
| 9-11 | 0 | 433 | NA |

**P309**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 6-89 | 0 | 1 | 0 |
| 4-91 | 0 | 318 | 22.5 |
| 5-01 | 0 | 27 | NA |
| 8-01[4] | 0 | 40 | NA |
| 5-02 | 0 | 50 | NA |
| 9-02 | 0 | 24 | NA |
| 5-03 | 0 | 91 | NA |
| 8-03 | 0 | 43 | NA |
| 4-04 | 0 | 38 | NA |
| 8-04 | 0 | 35 | NA |
| 4-05 | 0 | 75 | NA |
| 9-05 | 0 | 57 | NA |
| 5-06 | 0 | 47 | NA |
| 8-06 | 0 | 31 | NA |
| 5-07 | 0 | 47 | NA |
| 8-07 | 0 | 26 | NA |
| 4-08 | 0 | 20 | NA |
| 8-08 | 0 | 21 | NA |
| 5-09 | 0 | 16 | NA |
| 8-09 | 0 | 10 | NA |
| 6-10 | 0 | 12 | NA |
| 9-10 | 0 | 7 | NA |
| 6-11 | 0 | 7 | NA |
| 9-11 | 0 | 13 | NA |

**P310**

| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
|---|---|---|---|
| 4-91 | 0 | 33 | 8 |
| 5-01 | 0 | 13 | NA |
| 8-01[4] | 0 | 31 | NA |
| 5-02 | 0 | 14 | NA |
| 9-02 | 0 | 10 | NA |
| 5-03 | 0 | 16 | NA |
| 8-03 | 0 | 18 | NA |
| 4-04 | 0 | 14 | NA |
| 8-04 | 0 | 37 | NA |
| 4-05 | 0 | 31 | NA |
| 9-05 | 0 | 28 | NA |
| 5-06 | 0 | 11 | NA |
| 8-06 | 0 | 15 | NA |
| 5-07 | 0 | 12 | NA |
| 8-07 | 0 | 9 | NA |
| 4-08 | 0 | 5 | NA |
| 8-08 | 0 | 8 | NA |
| 5-09 | 0 | 2 | NA |
| 8-09 | 0 | 0 | NA |
| 6-10 | 0 | 3 | NA |
| 9-10 | 0 | 2 | NA |
| 6-11 | 0 | 1 | NA |

**Table 6**
**Historical Summary of Other PAH, CPAH, and Phenolic Analytical Results**
**1988 Through 2011**

**Drift Aquifer Wells**

All concentrations in micrograms per liter (ug/l).

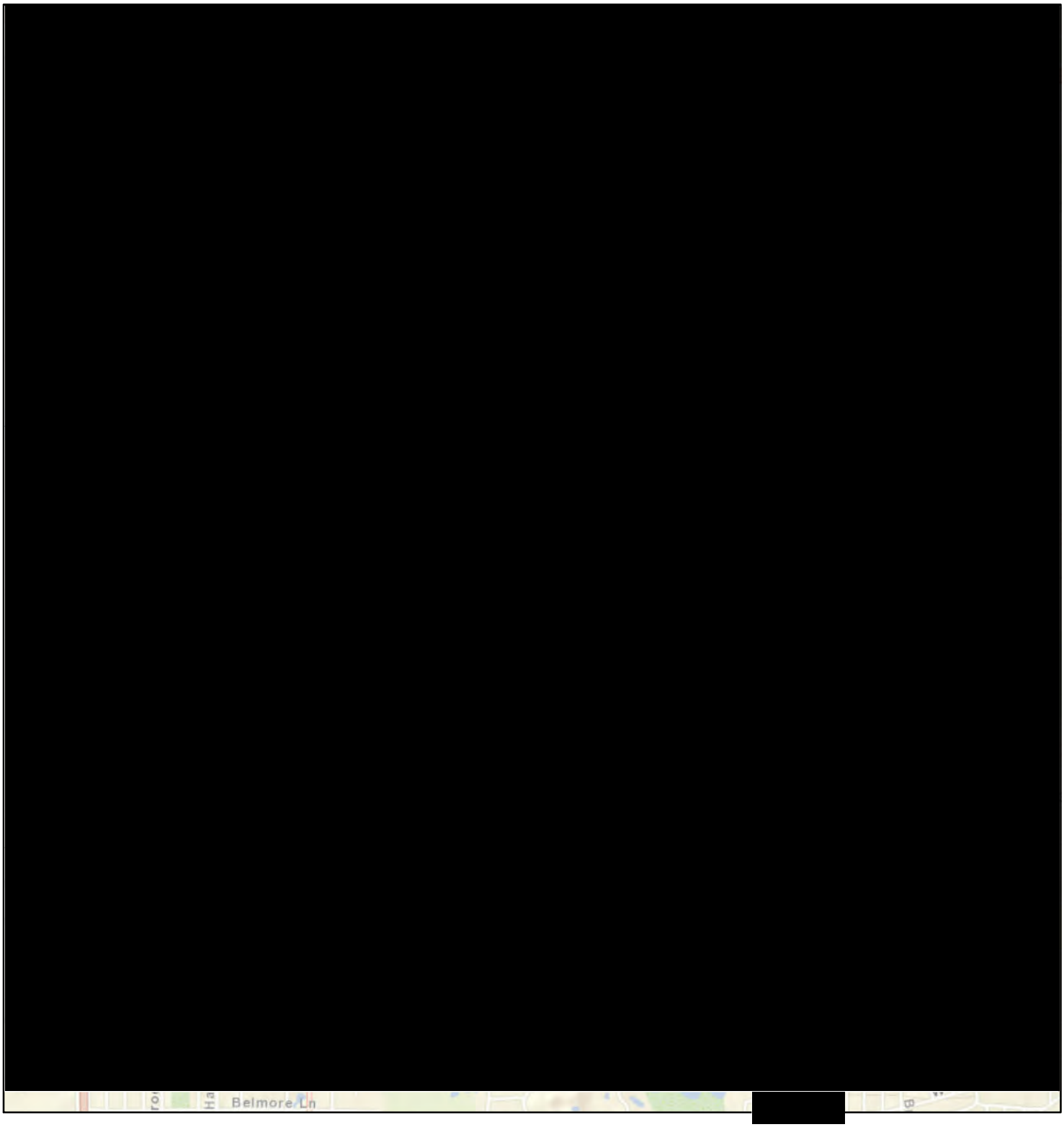
| W420 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 3-88 | 0 [3] | 3,242 | 440 |
| 5-88 | 0 | 3,420 | 330 |
| 8-88 | 0 | 2,477 | 220 |
| 10-88 | 0 | 1,148 | 44 |
| 3-89 | 0 | 2,400 | 120 |
| 6-89 | 0 | 3,400 | 129 |
| 9-89 | 0 | 3,400 | 220 |
| 12-89 | 0 | 3,400 | 110 |
| 3-90 | 0 | 3,950 | 239 |
| 5-90 | 0 | 2,430 | 231 |
| 8-90 | 0 | 3,150 | 244 |
| 12-90 | 0 | 3,030 | 228 |
| 3-91 | 0 | 4,200 | 232 |
| 6-91 | 0 | 2,494 | 221 |
| 9-91 | 0 | 4,967 | 210 |
| 10-91 | 0 | 4,163 | 194 |
| 2-92 | 0 | 1,526 | 177 |
| 6-92 | 0 | 3,229 | 204 |
| 9-92 | 0 | 2,281 | 167 |
| 10-92 | 0 | 2,374 | 236 |
| 3-93 | 0 | 4,337 | 18 |
| 4-93 | 0 | 2,929 | 207 |
| 8-93 | 0 | 1,825 | 136 |
| 11-93 | 0 | 2,052 | 148 |
| 2-94 | 0 | 2,033 | 109 |
| 6-94 | 0 | 2,181 | 151 |
| 8-94 | 0 | 2,026 | 147 |
| 10-94 | 0 | 2,082 | 151 |
| 3-95 | 0 | 2,431 | 143 |
| 5-95 | 0 | 1,873 | 134 |
| 9-95 | 0 | 2,523 | 91 |
| 10-95 | 0 | 2,332 | 113 |
| 2-96 | 0 | 1,968 | 121 |
| 4-96 | 0 | 2,165 | 130 |
| 7-96 | 0 | 2,725 | 87 |
| 10-96 | 0 | 2,164 | 118 |
| 2-97 | 0 | 2,324 | 122 |
| 5-97 | 0 | 3,343 | 134 |
| 9-97 | 0 | 2,151 | 261 |
| 1-98 | 0 | 2,483 | 140 |
| 2-98 | 0 | 2,938 | 124 |
| 5-98 | 0 | 2,933 | 160 |
| 9-98 | 0 | 3,144 | 80 |
| 11-98 | 0 | 2,570 | 180 |
| 3-99 | 0 | 3,314 | 200 |
| 4-99 | 0 | 3,414 | 170 |
| 8-99 | 0 | 2,425 | 140 |
| 11-99 | 0 | 2,345 | 170 |
| 2-00 | 0 | 2,312 | 150 |
| 5-00 | 0 | 4,441 | 190 |
| 9-00 | 0 | 3,070 | 110 |
| 12-00 | 0 | 2,500 | 90 |
| 3-01 | 0 | 3,680 | 110 |
| 5-01 | 0 | 6,956 | 300 |
| 8-01 | 0 | 2,535 | 140 |
| 10-01 | 0 | 3,608 | 190 |
| 3-02 | 0 | 8,578 | 110 |
| 5-02 | 0 | 4,163 | NA |
| 9-02 | 0 | 3,981 | NA |
| 10-02 | 0 | 3,456 | NA |
| 3-03 | 0 | 3,558 | NA |
| 5-03 | 0 | 4,122 | NA |
| 8-03 | 0 | 3,148 | NA |
| 11-03 | 0 | 2,835 | NA |
| 3-04 | 0 | 3,776 | NA |
| 4-04 | 0 | 3,805 | NA |
| 8-04 | 0 | 3,167 | NA |
| 11-04 | 0 | 4,685 | NA |
| 3-05 | 0 | 4,005 | NA |
| 5-05 | 0 | 2,463 | NA |
| 9-05 | 0 | 4,447 | NA |
| 11-05 | 0 | 4,205 | NA |
| 3-06 | 0 | 3,605 | NA |

| W420 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 5-06 | 0 | 3,511 | NA |
| 8-06 | 0 | 3,782 | NA |
| 11-06 | 0 | 3,682 | NA |
| 3-07 | 0 | 3,444 | NA |
| 5-07 | 0 | 3,029 | NA |
| 8-07 | 0 | 3,209 | NA |
| 11-07 | 0 | 3,539 | NA |
| 3-08 | 0 | 3,397 | NA |
| 4-08 | 0 | 3,514 | NA |
| 3-09 | 0 | 2,073 | NA |
| 5-09 | 0 | 3,168 | NA |
| 8-09 | 0 | 3,483 | NA |
| 11-09 | 0 | 3,492 | NA |
| 3-10 | 0 | 2,911 | NA |
| 6-10 | 0 | 2,623 | NA |
| 9-10 | 0 | 2,389 | NA |
| 12-10 | 0 | 2,202 | NA |
| 3-11 | 0 | 2,277 | NA |
| 6-11 | 0 | 2,252 | NA |
| 9-11 | 0 | 1,762 | NA |
| 12-11 | 0 | 1,371 | NA |

| W422 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 1st Quarter | 0 | 27 | 11 |
| 2nd Quarter | 0 | 57 | 0 |
| 8-88 | 0 | 77 | 24 |
| 10-88 | 0 | 50 | 84 |
| 3-89 | 0 | 50 | 11 |
| 6-89 | 0 | 50 | 14 |
| 9-89 | 0 | 60 | 20 |
| 12-89 | 0 | 50 | 13 |
| 3-90 | 0 | 75 | 21 |
| 5-90 | 0 | 60 | 14 |
| 8-90 | 0 | 90 | 14 |
| 12-90 | 0 | 60 | 18 |
| 4-91 | 0 | 67 | 13 |
| 9-91 | 0 | - | 17 |
| 10-91 | 0 | 88 | 18 |
| 2-92 | 0 | 121 | 16 |
| 6-92 | 0 | 872 | - |
| 9-92 | 0 | 91 | 9 |
| 10-92 | 0 | 89 | 28 |
| 3-93 | 0 | 94 | 0 |
| 4-93 | 0 | 96 | 10 |
| 8-93 | 0 | 81 | 16 |
| 11-93 | 0 | 74 | 16 |
| 2-94 | 0 | 61 | 0 |
| 6-94 | 0 | 66 | 7 |
| 8-94 | 0 | 66 | 30 |
| 10-94 | 0 | 59 | 11 |
| 3-95 | 0 | 54 | 11 |
| 5-95 | 0 | 62 | 5 |
| 9-95 | 0 | 53 | 14 |
| 10-95 | 0 | 29 | 10 |
| 2-96 | 0 | 24 | 12 |
| 4-96 | 0 | 26 | 11 |
| 7-96 | 0 | 26 | 9 |
| 10-96 | 0 | 23 | 8 |

| W422 | | | |
|---|---|---|---|
| Sampling Date | Total CPAH[1] | Total Other PAH[2] | Total Phenolics |
| 2-97 | 0 | 21 | 9 |
| 5-97 | 0 | 20 | 11 |
| 9-97 | 0 | 19 | 18 |
| 1-98 | 0 | 18 | 11 |
| 2-98 | 0 | 21 | 6 |
| 5-98 | 0 | 17 | 9 |
| 9-98 | 0 | 7 | 0 |
| 11-98 | 0 | 13 | 9 |
| 3-99 | 0 | 20 | 0 |
| 4-99 | 0 | 14 | 8 |
| 8-99 | 0 | 13 | 10 |
| 11-99 | 0 | 13 | 4 |
| 2-00 | 0 | 12 | 10 |
| 5-00 | 0 | 19 | 10 |
| 9-00 | 0 | 13 | 5 |
| 12-00 | 0 | 6 | 4 |
| 5-01 | 0 | 19 | 5 |
| 9-01 | 0 | 13 | - |
| 10-01 | 0 | 7 | 5 |
| 3-02 | 0 | 15 | 11 |
| 5-02 | 0 | 15 | NA |
| 9-02 | 0 | 9 | NA |
| 5-03 | 0 | 9 | NA |
| 8-03 | 0 | 4 | NA |
| 4-04 | 0 | 4 | NA |
| 8-04 | 0 | 1 | NA |
| 4-05 | 0 | 7 | NA |
| 9-05 | 0 | 9 | NA |
| 5-06 | 0 | 7 | NA |
| 8-06 | 0 | 0 | NA |
| 5-07 | 0 | 6 | NA |
| 8-07 | 0 | 9 | NA |
| 4-08 | 0 | 28 | NA |
| 8-08 | 0 | 10 | NA |
| 5-09 | 0 | 7 | NA |
| 8-09 | 0 | 5 | NA |
| 6-10 | 0 | 14 | NA |
| 9-10 | 0 | 9 | NA |

# Figures




Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

## Explanation

REILLY SITE

Well Location

SLP11 Well Name
9-11 Date
-- Water Level (ft)
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ng/L)
-- Sum of Carconogenic PAH parameters (ng/L)
-- Sum of Other PAH parameters (ng/L)
0 = Not Detected
-- = Not Sampled/Not Available

0 2,500 Feet
1 inch = 2,500 feet

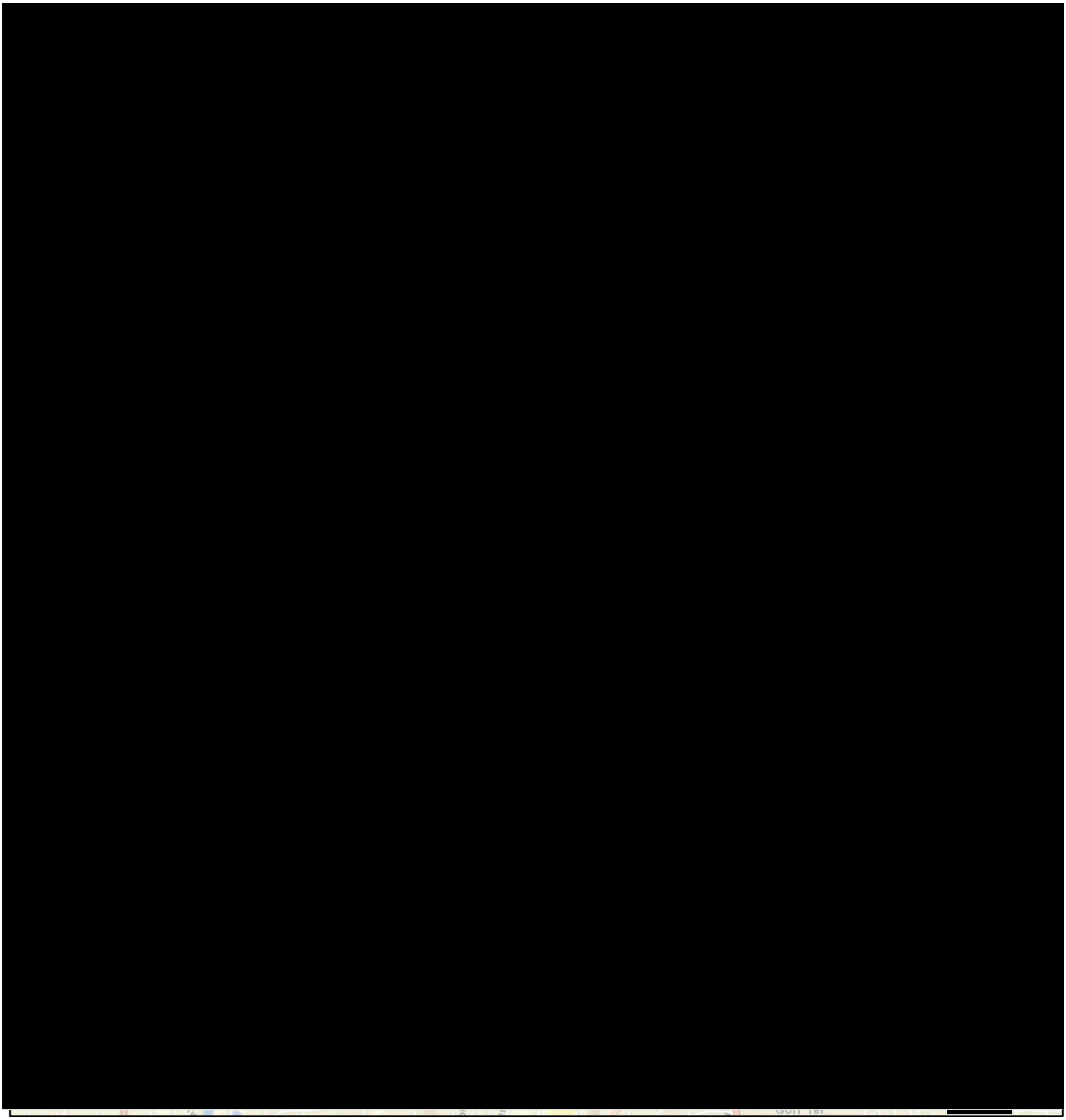

Site Location

# Summary of Groundwater Monitroing Results For the Mt. Simon-Hinckley Aquifer - 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

## Figure 1

File: Fig1_MSH
Summit Proj. No.: 0987-0009
Plot Date: 03-06-12
Arc Operator: PRB
Reviewed by: WMG



Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

## Explanation

Inferred area where PAH concentrations exceed:

REILLY SITE

MDH criteria

CD-RAP criteria

Groundwater Elevation Contour (CI = 10)

Well Location

SLP11 Well Name
6-11 Date
-- Water Level (ft)
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ng/L)
-- Sum of Carconogenic PAH parameters (ng/L)
-- Sum of Other PAH parameters (ng/L)
0 = Not Detected
-- = Not Sampled/Not Available

Site Location

0 3,000 Feet

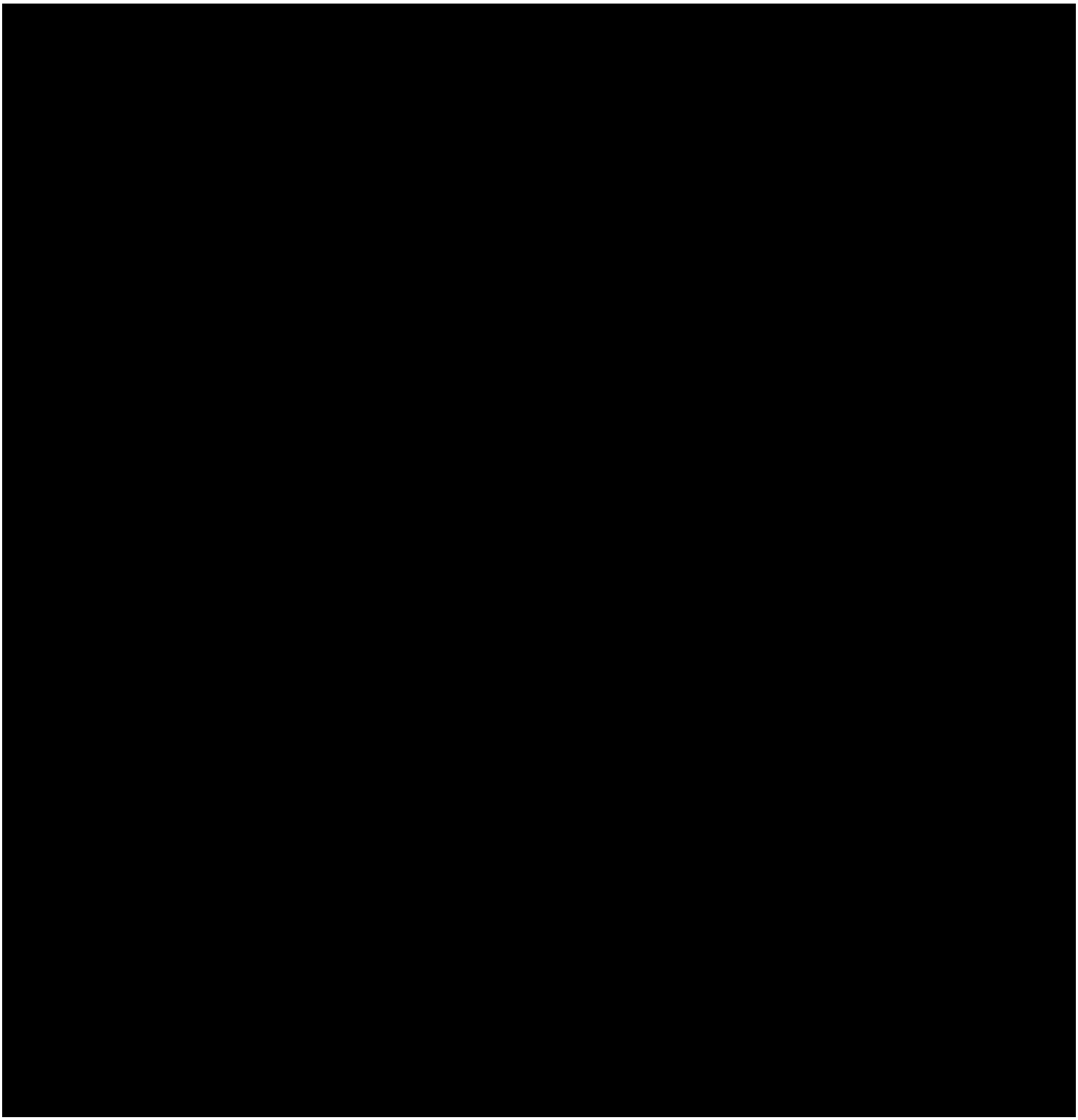
1 inch = 3,000 feet

# Summary of Groundwater Monitroing Results For the Prairie Du Chien–Jordan Aquifer - First Half, 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

## Figure 2

File: Fig2_OPCJ_1stHalf
Summit Proj. No.: 0987-0009
Plot Date: 03-09-12
Arc Operator: PRB
Reviewed by: WMG



Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

## Explanation

REILLY SITE

Inferred area where PAH concentrations exceed:

Well Location

MDH criteria

CD-RAP criteria

SLP11 Well Name
9-11 Date
-- Water Level (ft)
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ng/L)
-- Sum of Carconogenic PAH parameters (ng/L)
-- Sum of Other PAH parameters (ng/L)
0 = Not Detected
-- = Not Sampled/Not Available

Site Location

0 2,500 Feet

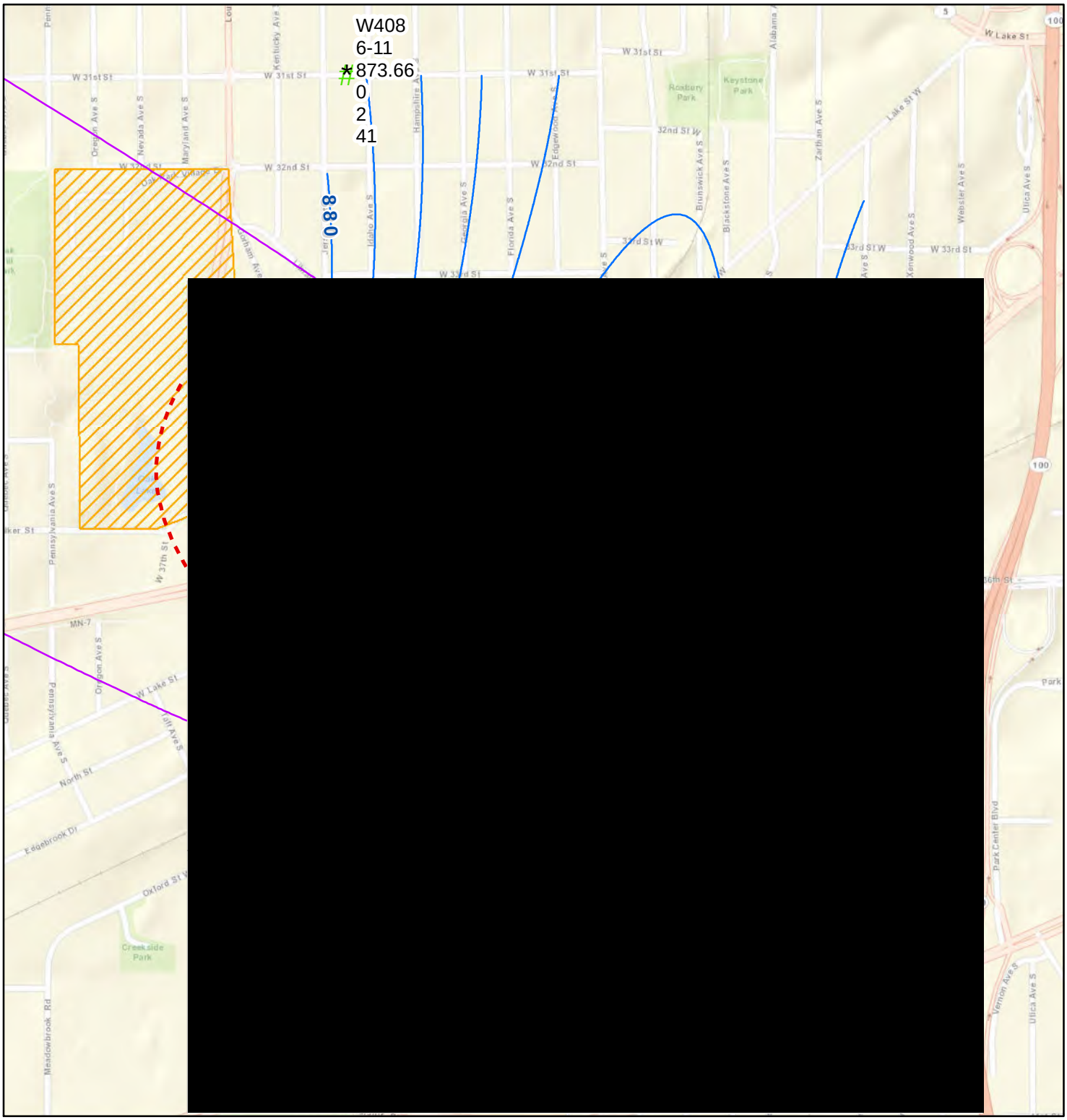
1 inch = 2,500 feet

# Summary of Groundwater Monitroing Results For the Prairie Du Chien–Jordan Aquifer - Second Half, 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

## Figure 3

File: Fig3_OPCJ_2ndHalf
Summit Proj. No.: 0987-0009
Plot Date: 03-07-12
Arc Operator: PRB
Reviewed by: WMG




Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

**Explanation**

REILLY SITE

CD-RAP criteria

Capture Zone: W410 (Based on historical flow direction)

Groundwater Elevation Contour (CI = 10)

Well Location

SLP11 Well Name
6-11 Date
-- Water Level (ft)
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ng/L)
-- Sum of Carconogenic PAH parameters (ng/L)
-- Sum of Other PAH parameters (ng/L)

* = Groundwater elevation is a maximum value (level was below the pressure transducer)
0 = Not Detected
-- = Not Sampled/Not Available


Site Location

0 1,000 Feet

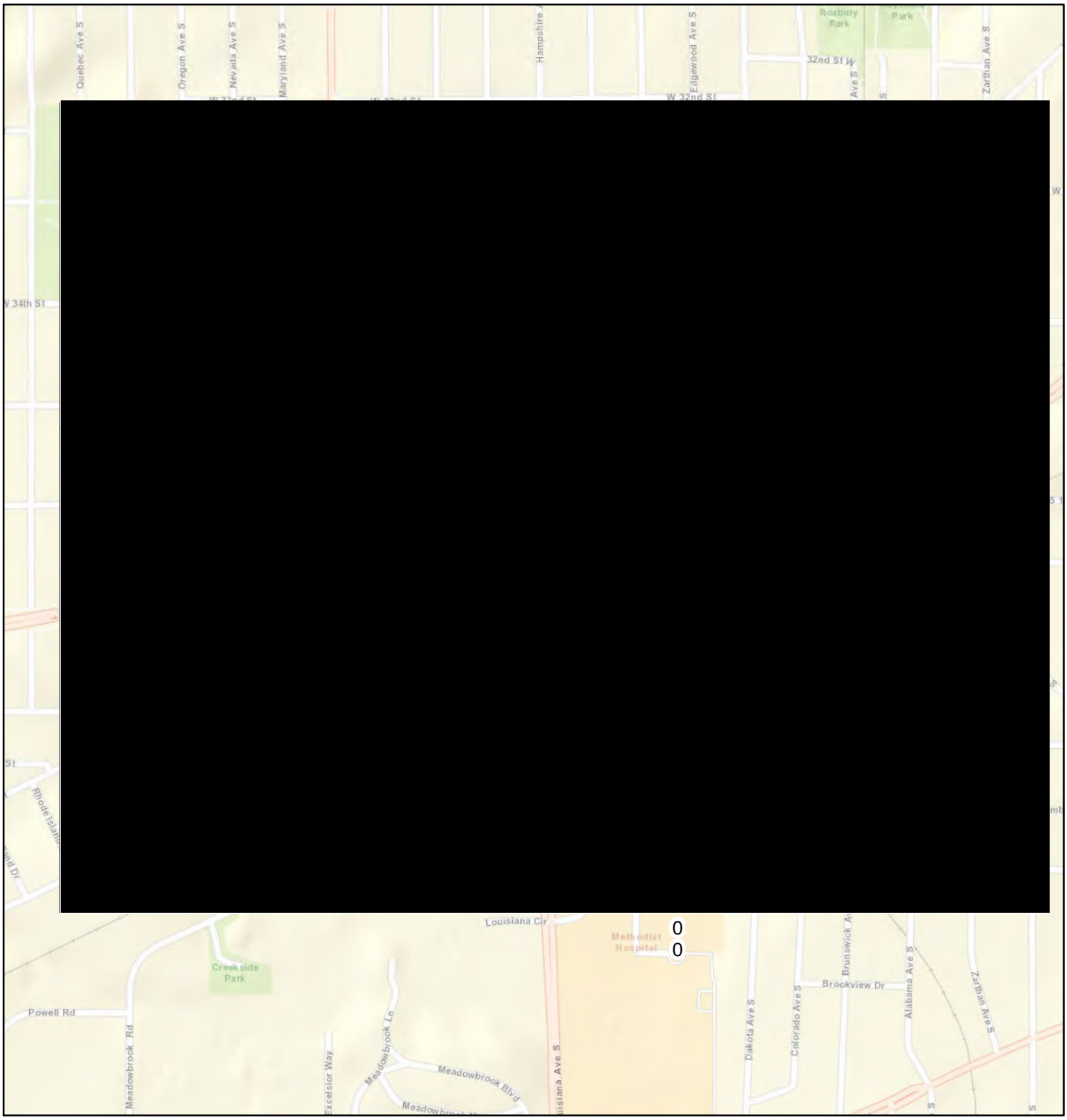
1 inch = 1,000 feet

# Summary of Groundwater Monitroing Results For the St. Peter Aquifer - 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

## Figure 4

File: Fig4_OSTP
Summit Proj. No.: 0987-0009
Plot Date: 03-09-12
Arc Operator: PRB
Reviewed by: WMG




Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

REILLY SITE

Capture Zone: W420/W421
(Based on historical flow direction)

**Inferred area where PAH concentrations exceed:**
MDH criteria
CD-RAP criteria

Groundwater Elevation Contour (CI = 2)

Well Location

SLP11 Well Name
6-11 Date
-- Water Level (ft)
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ug/L)
-- Sum of Carconogenic PAH parameters (ug/L)
-- Sum of Other PAH parameters (ug/L)

* = Denotes groundwater elevation from 10-11
** = W421 groundwater elevation was approximately 30 feet lower than shown in contours (Data not used for contouring).
0 = Not Detected
-- = Not Sampled/Not Available


Site Location

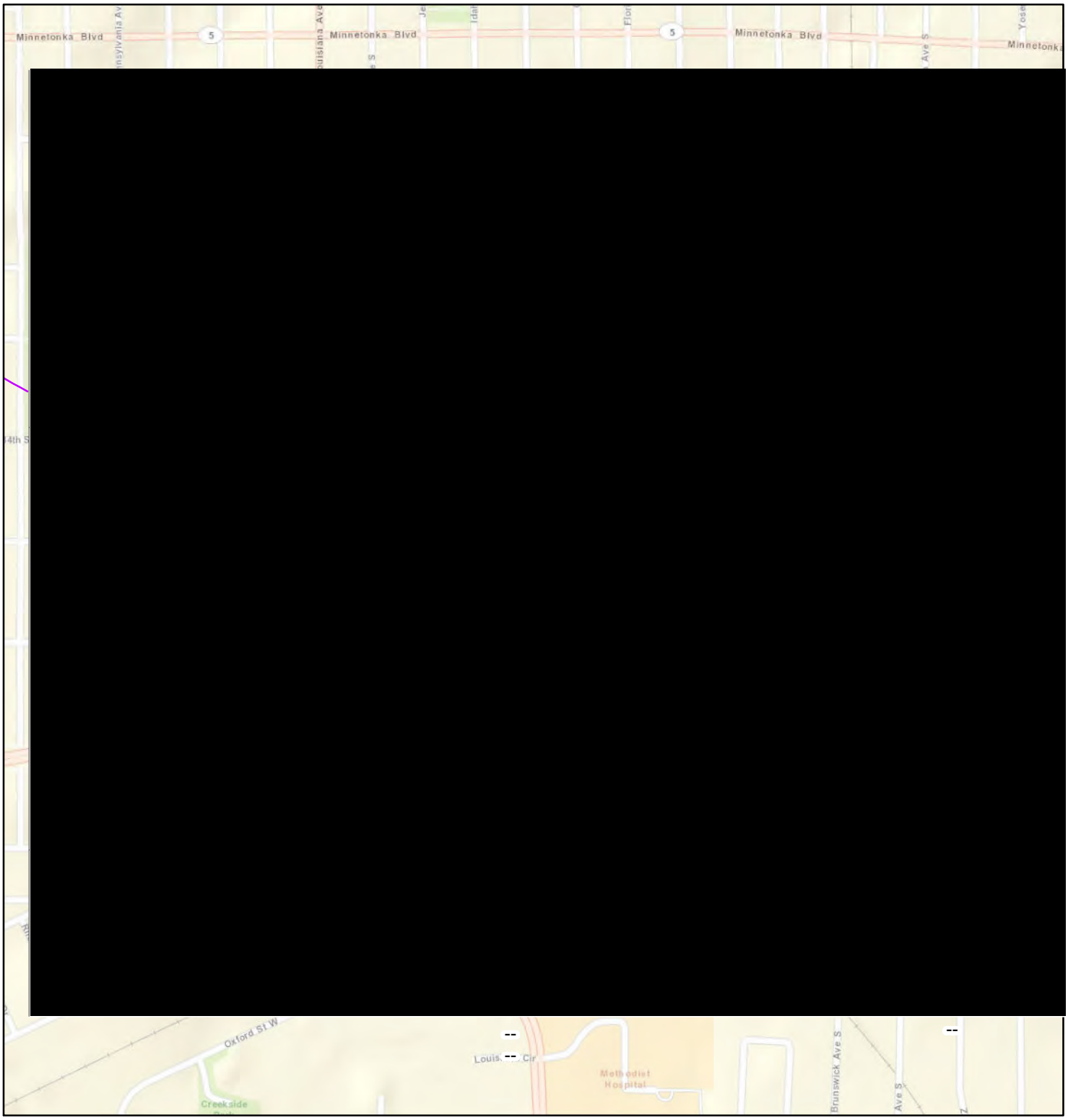
0 900 Feet

# Summary of Groundwater Monitroing Results For the Platteville Aquifer - 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

## Figure 5

File: Fig5_OPVL
Summit Proj. No.: 0987-0009
Plot Date: 03-09-12
Arc Operator: PRB
Reviewed by: WMG




Map adapted from U.S. and Canada Detailed Streets (2008), Tele Atlas North America, Inc., ESRI.

REILLY SITE
Capture Zone: W420
Capture Zone: W439
Groundwater Elevation Contour (CI = 3)
Well Location

Inferred area where PAH concentrations exceed:
MDH criteria
CD-RAP criteria

Site Location

SLP11 Well Name
6-11 Date
-- Water Level (ft) *
-- Sum of Benzo(a)pyrene and Dibenzo(a,h)anthracene (ug/L)
-- Sum of Carconogenic PAH parameters (ug/L)
-- Sum of Other PAH parameters (ug/L)
* = Denotes groundwater elevation from 10-11
0 = Not Detected
-- = Not Sampled/Not Available

0 900 Feet

# Summary of Groundwater Monitroing Results For the Drift Aquifer - 2011
## 2011 Annual Report
## Reilly Site, City of St. Louis Park, Minnesota

Summit Envirosolutions

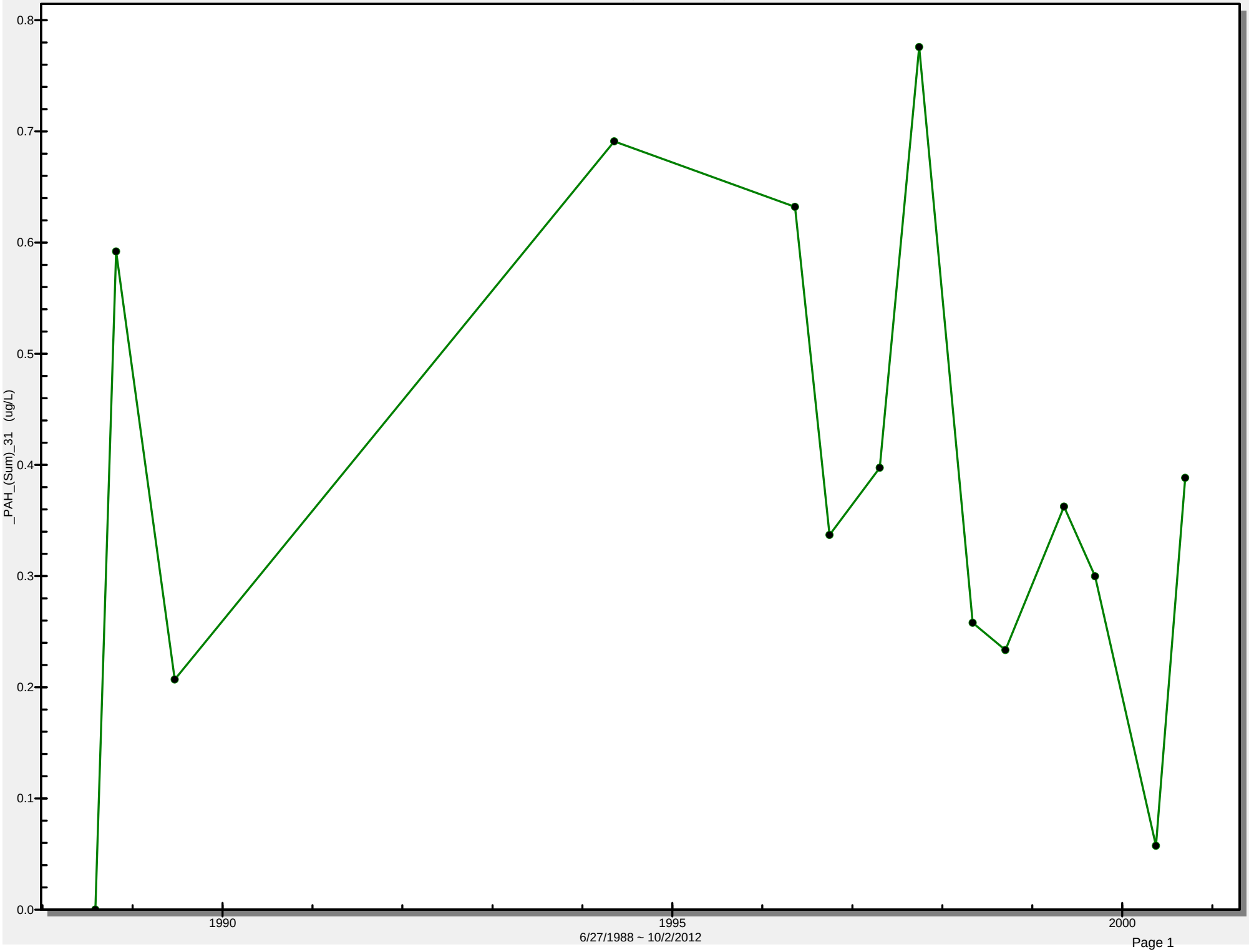
## Figure 6

File: Fig6_Drift
Summit Proj. No.: 0987-0009
Plot Date: 03-09-12
Arc Operator: PRB
Reviewed by: WMG

# Attachment A

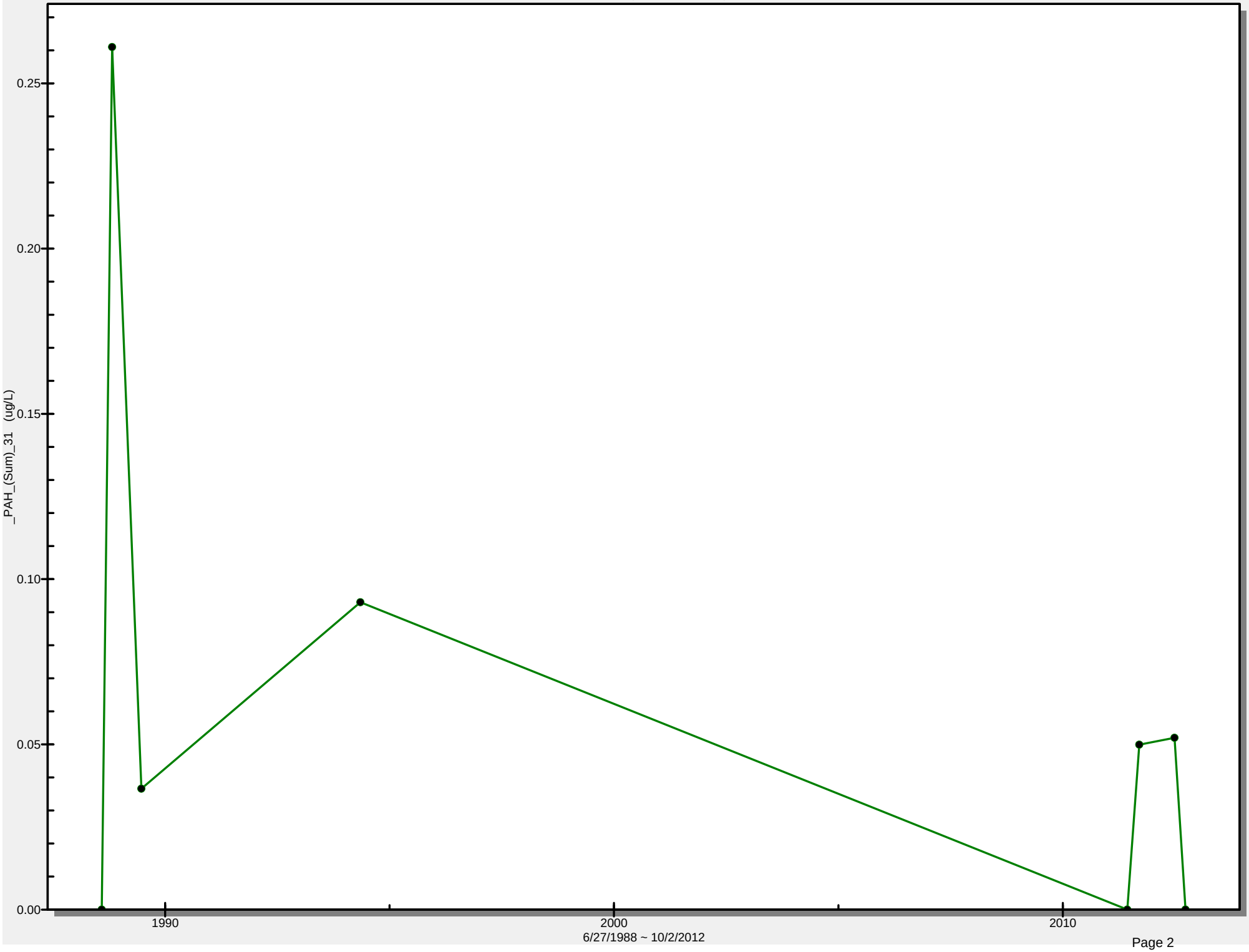
# Well W1

Total PAH Sum (CPAH and OPAH)



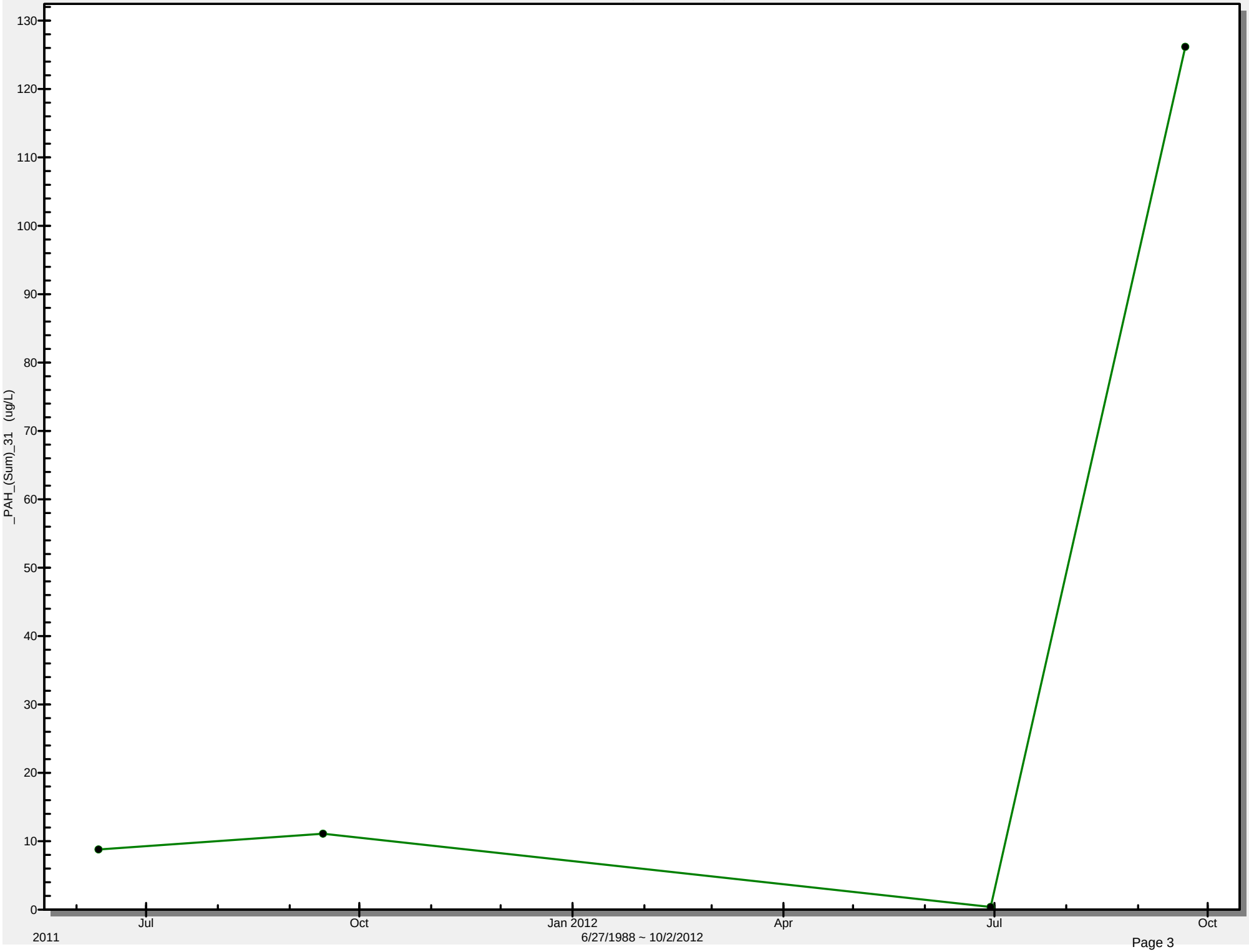
# Well W2

Total PAH Sum (CPAH and OPAH)



# Well W9

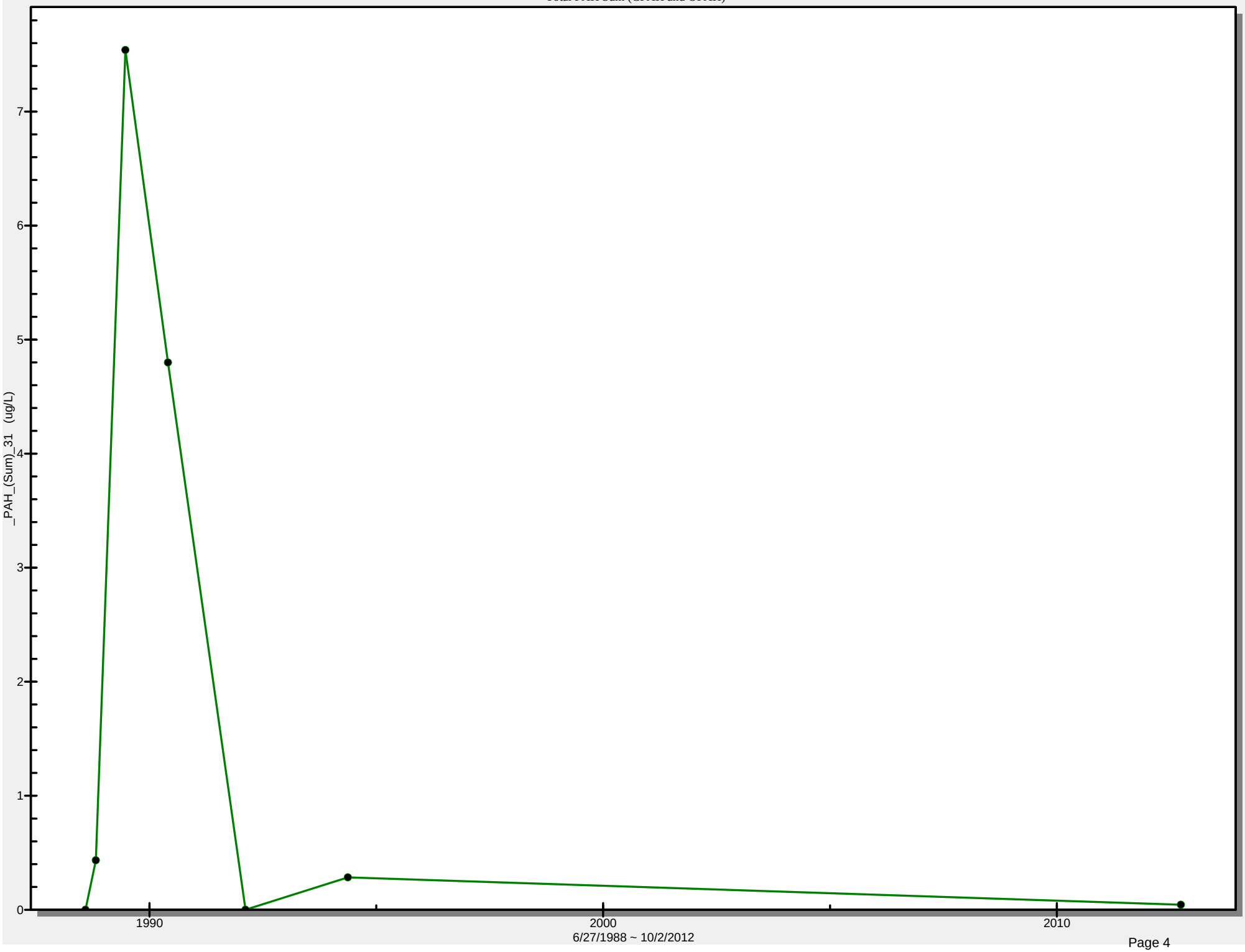
Total PAH Sum (CPAH and OPAH)




6/27/1988 ~ 10/2/2012

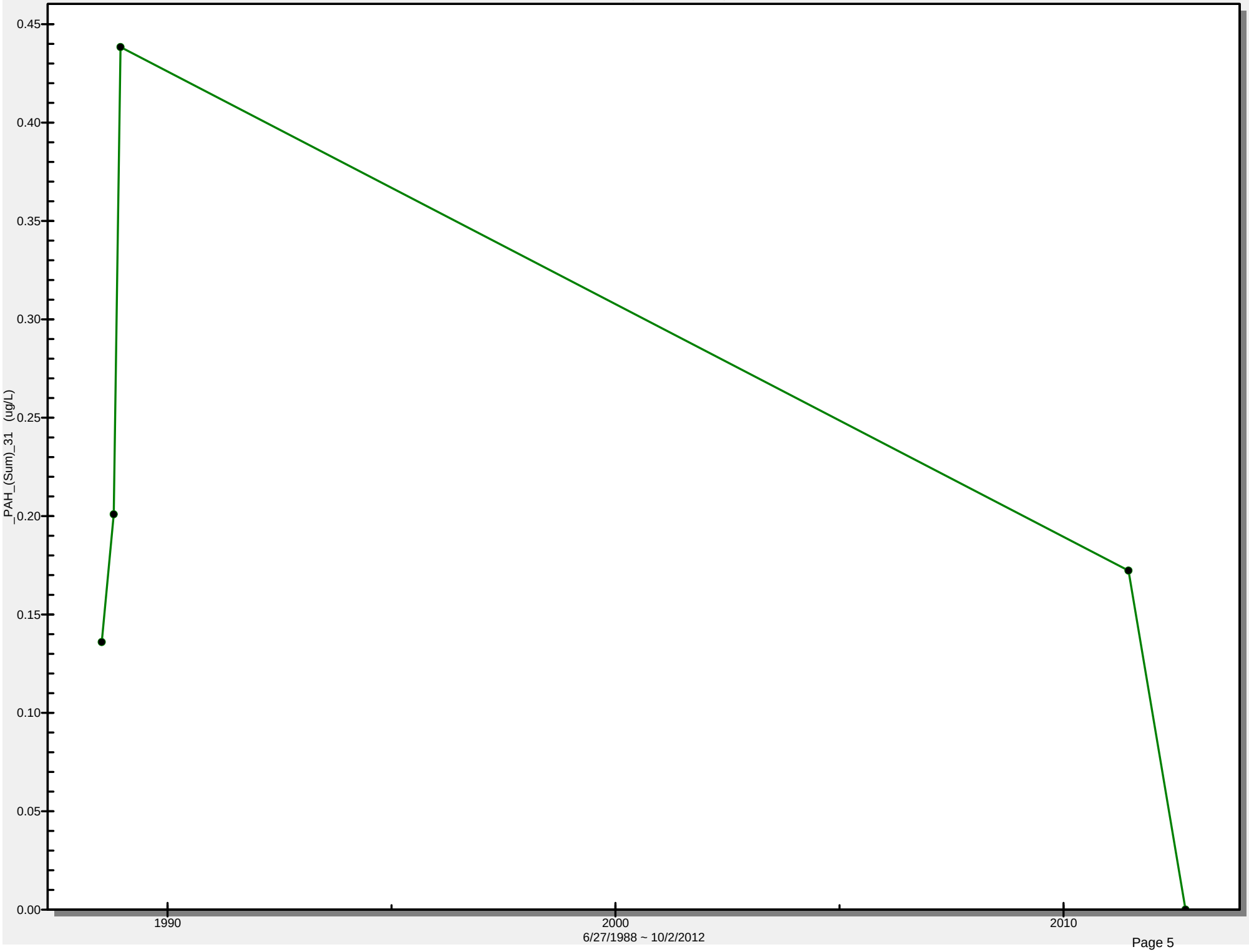
# Well W10

Total PAH Sum (CPAH and OPAH)



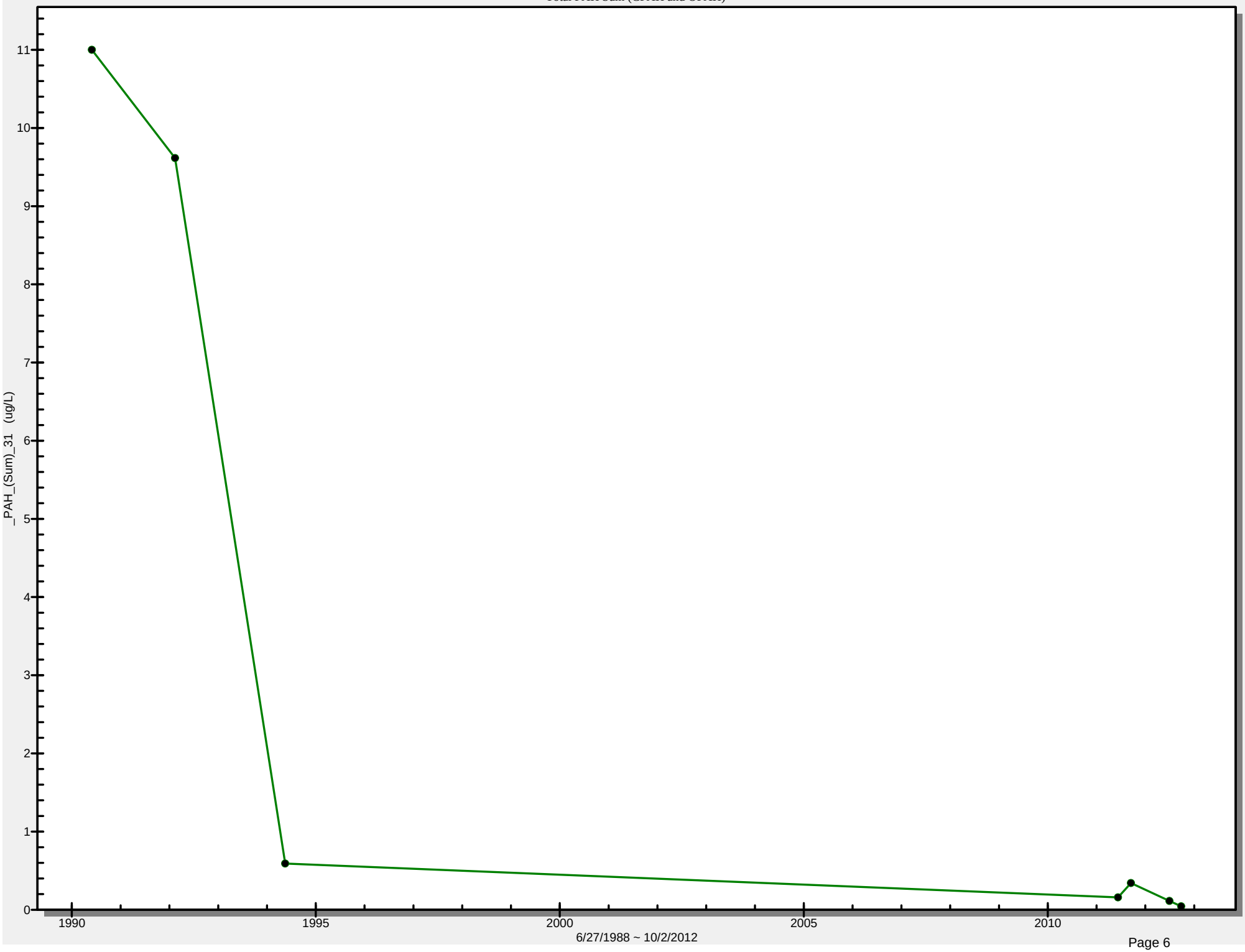
# Well W14

Total PAH Sum (CPAH and OPAH)



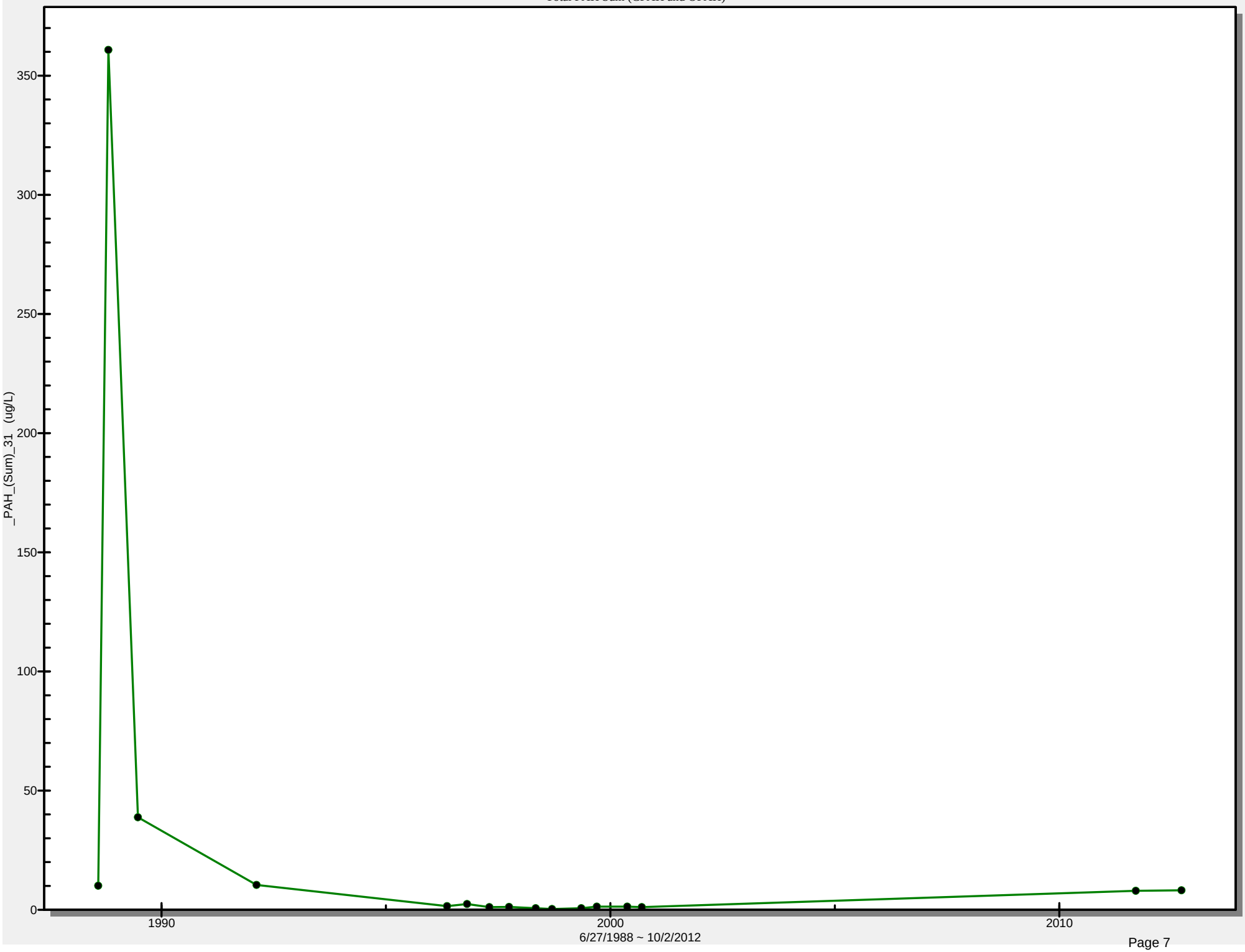
# Well W15

Total PAH Sum (CPAH and OPAH)



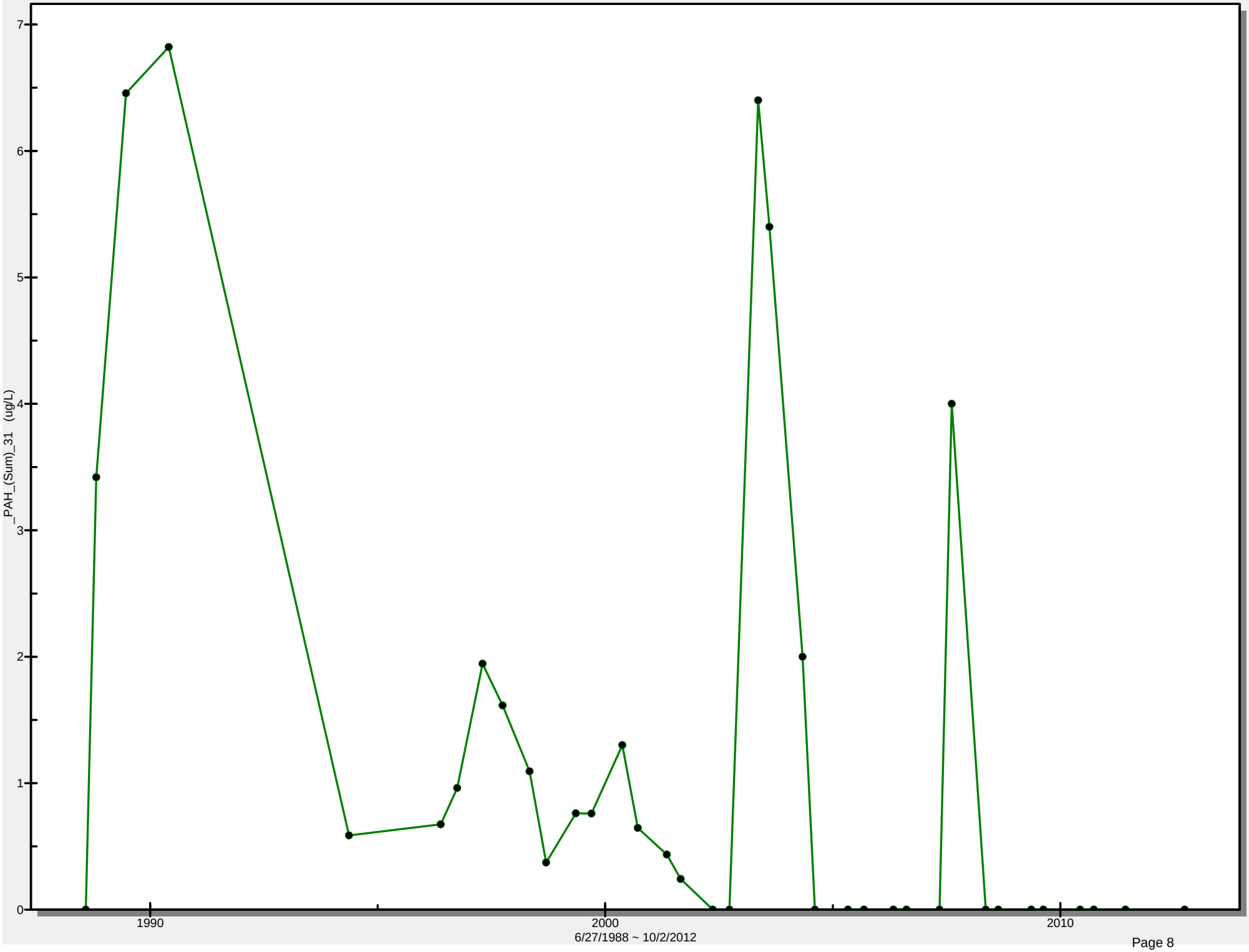
# Well W18

Total PAH Sum (CPAH and OPAH)



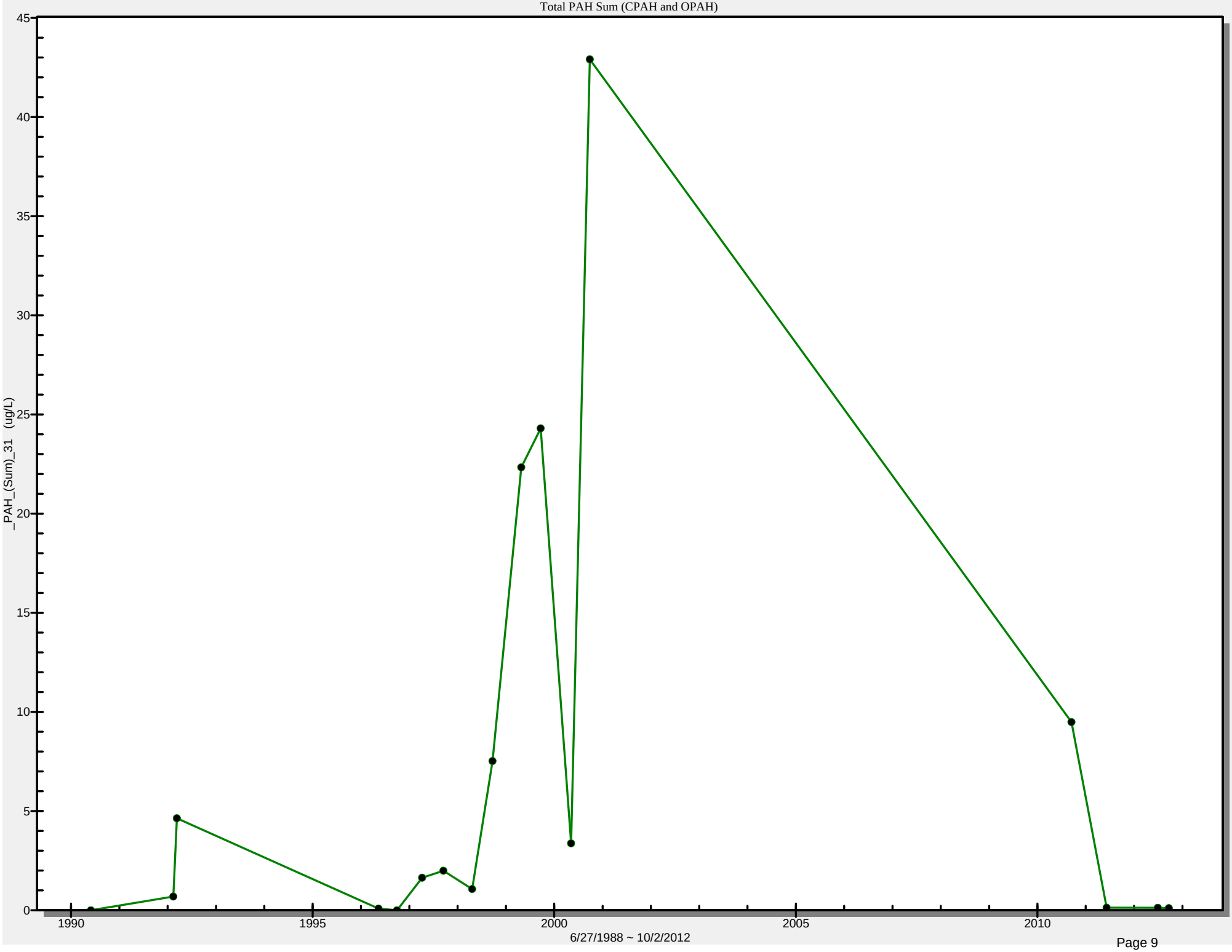
# Well W20

Total PAH Sum (CPAH and OPAH)



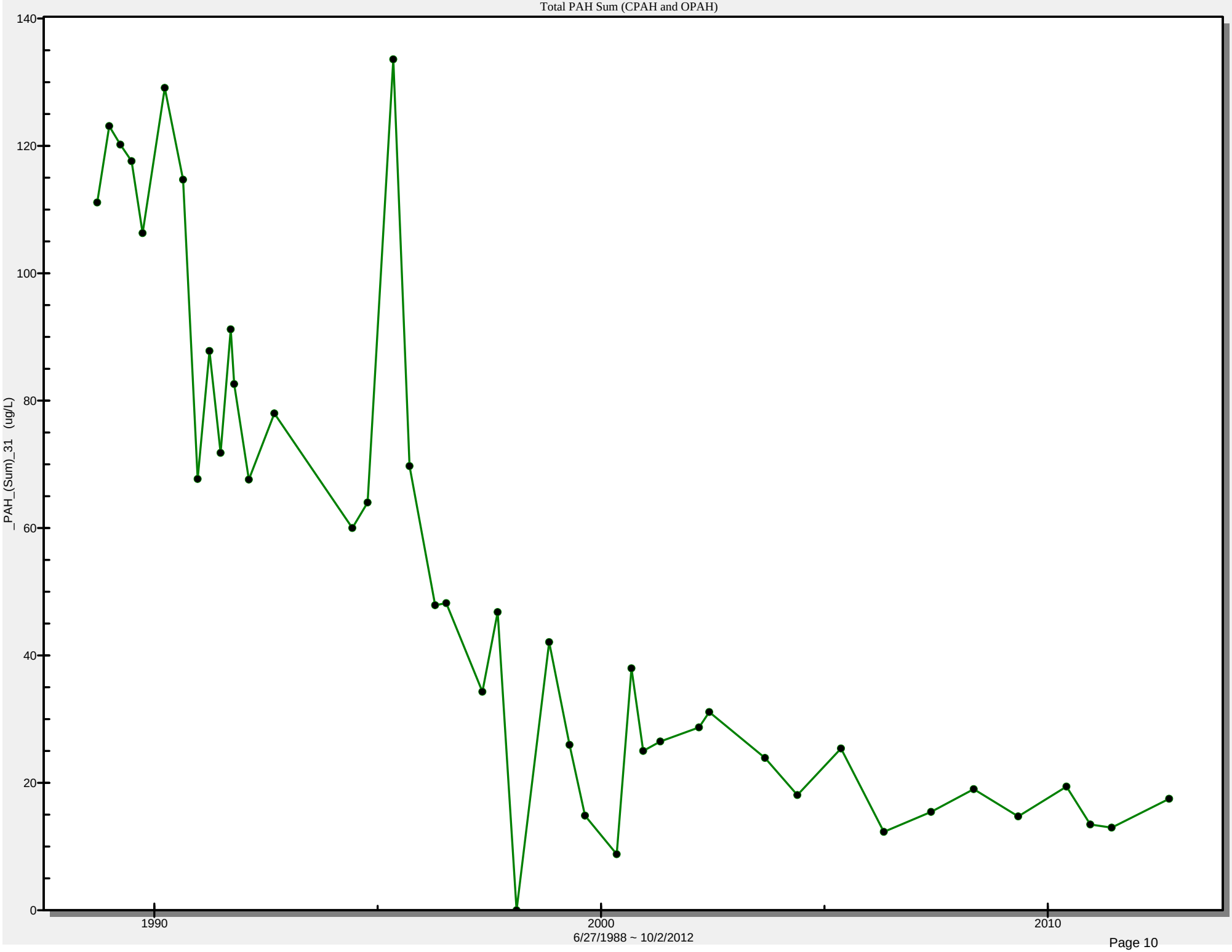
# Well W22

Total PAH Sum (CPAH and OPAH)



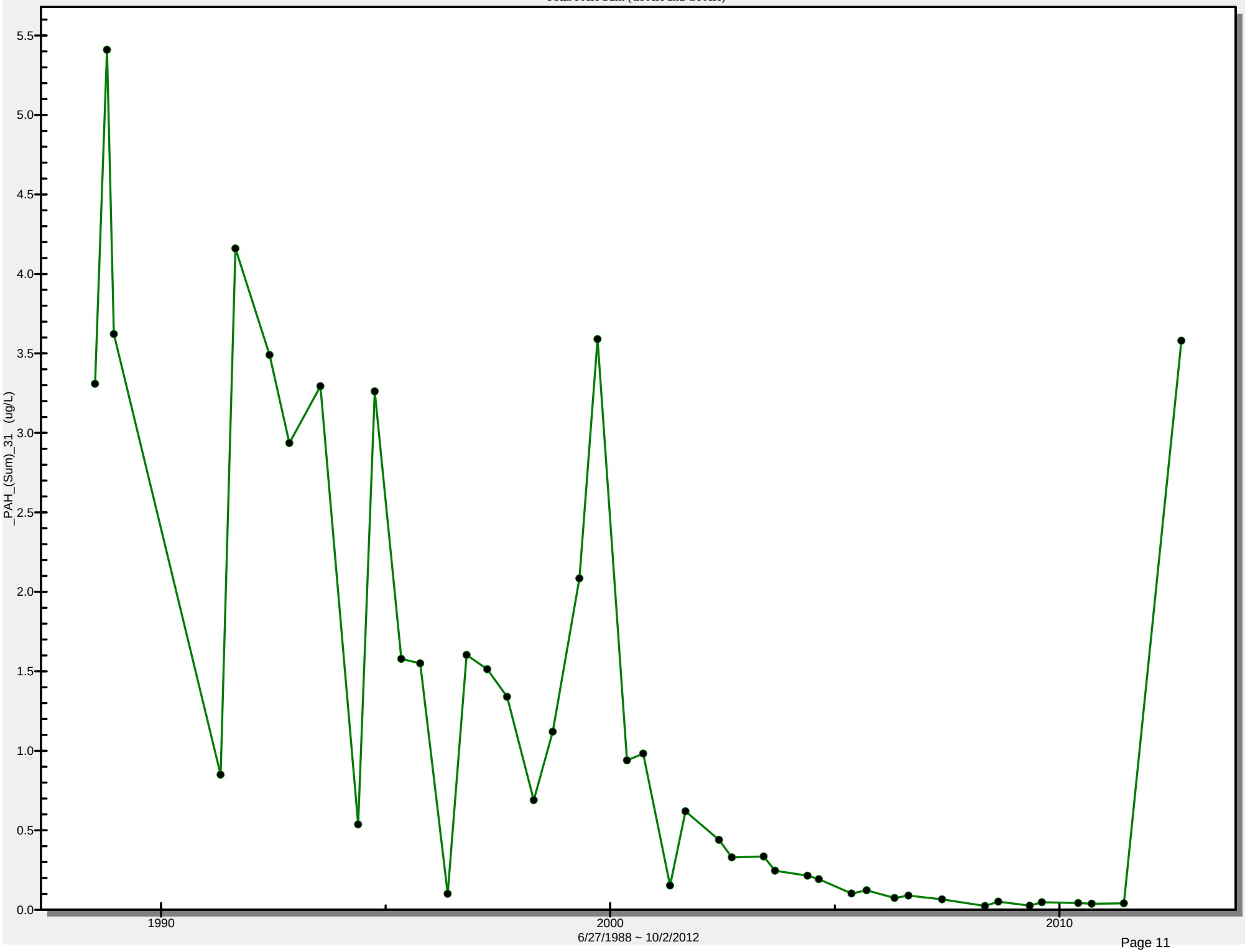
# Well W23

Total PAH Sum (CPAH and OPAH)



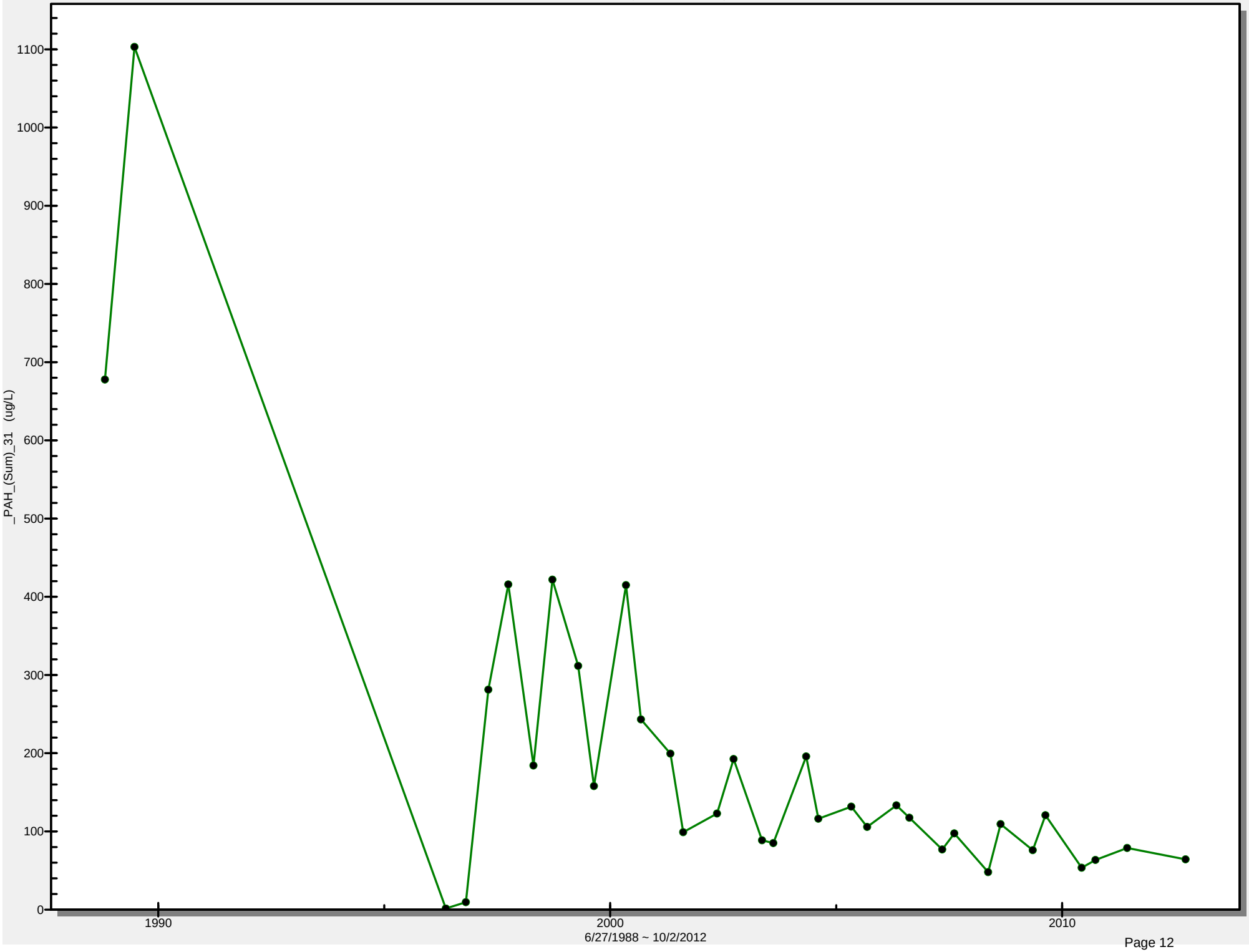
# Well W24

Total PAH Sum (CPAH and OPAH)



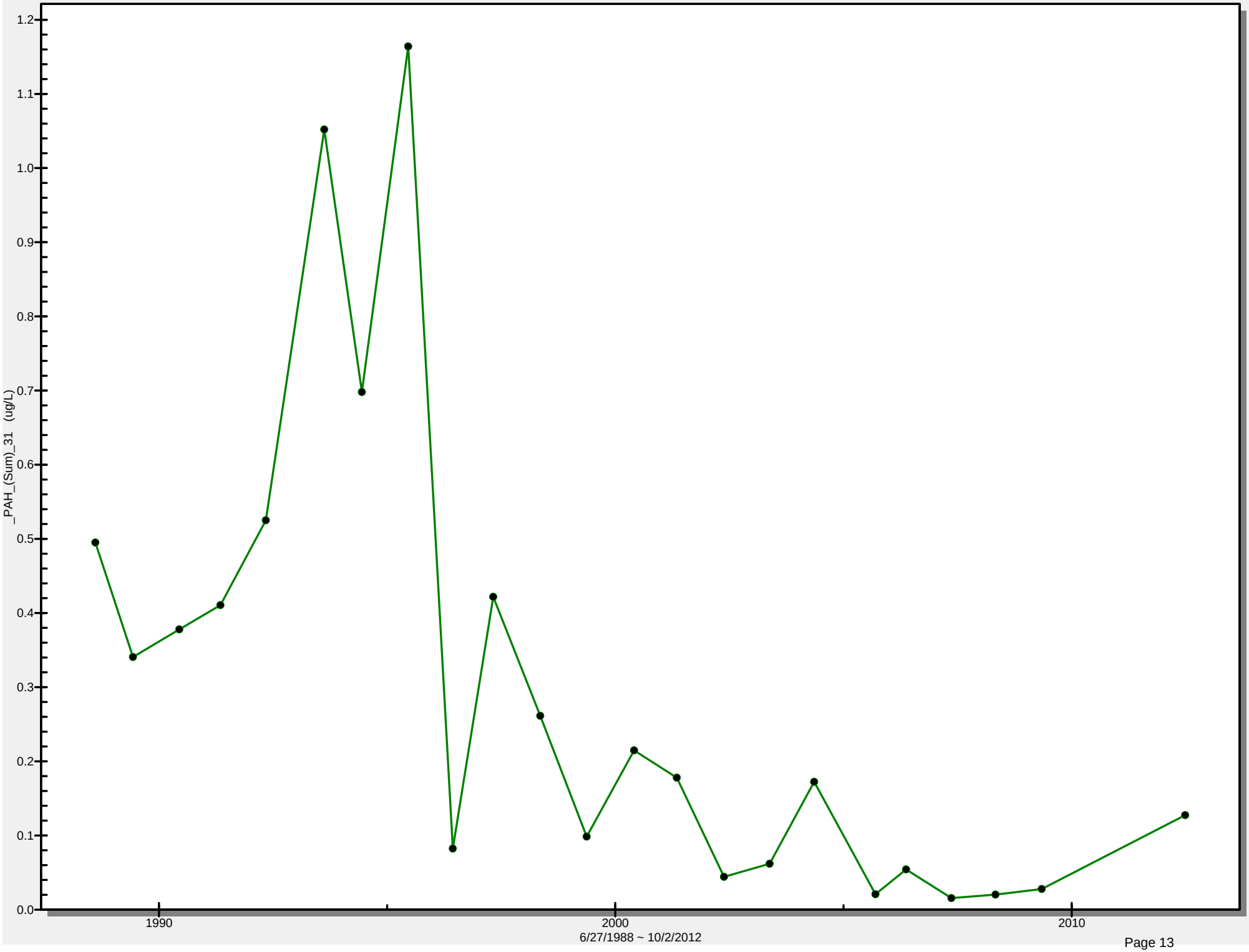
# Well W27

Total PAH Sum (CPAH and OPAH)



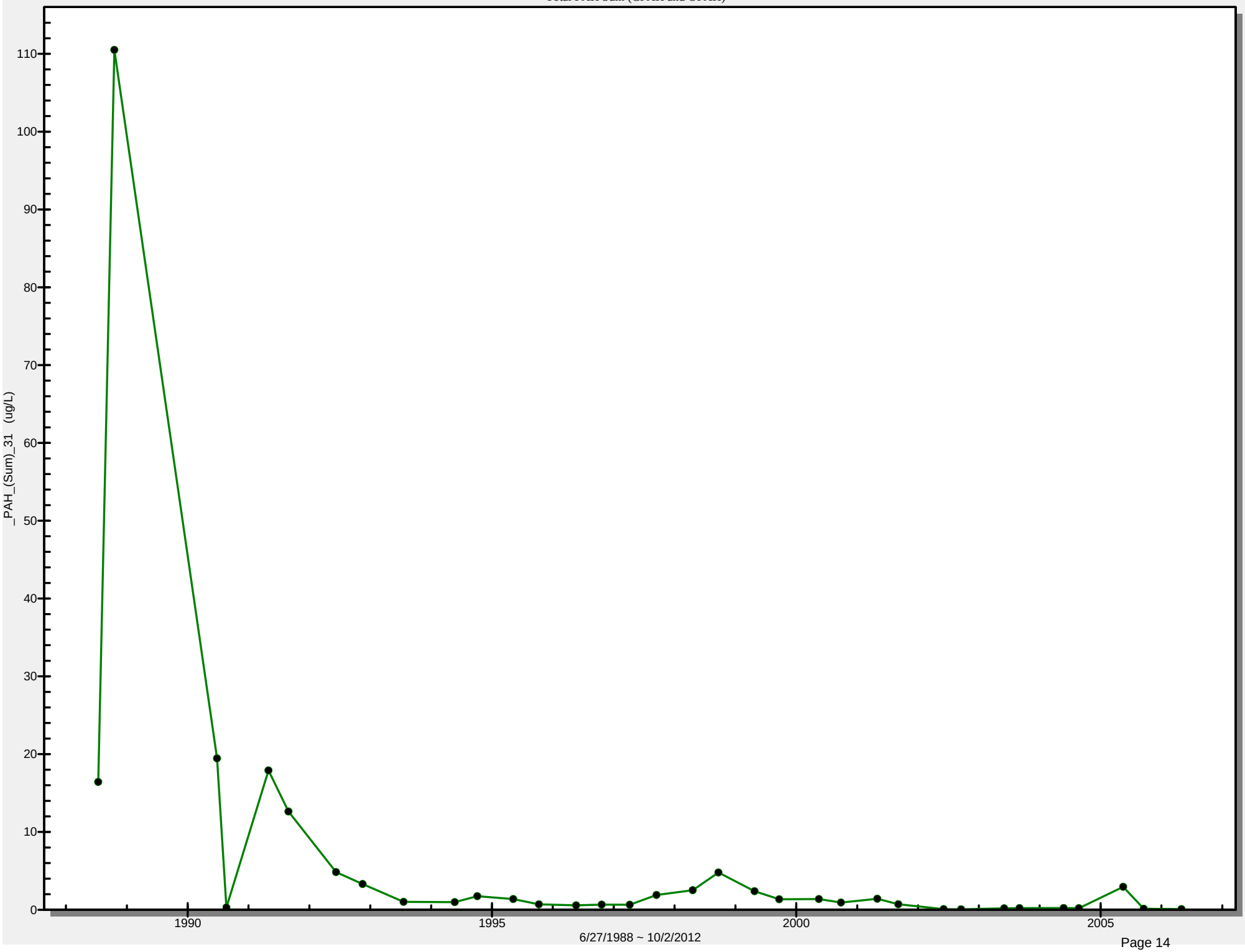
# Well W29

Total PAH Sum (CPAH and OPAH)



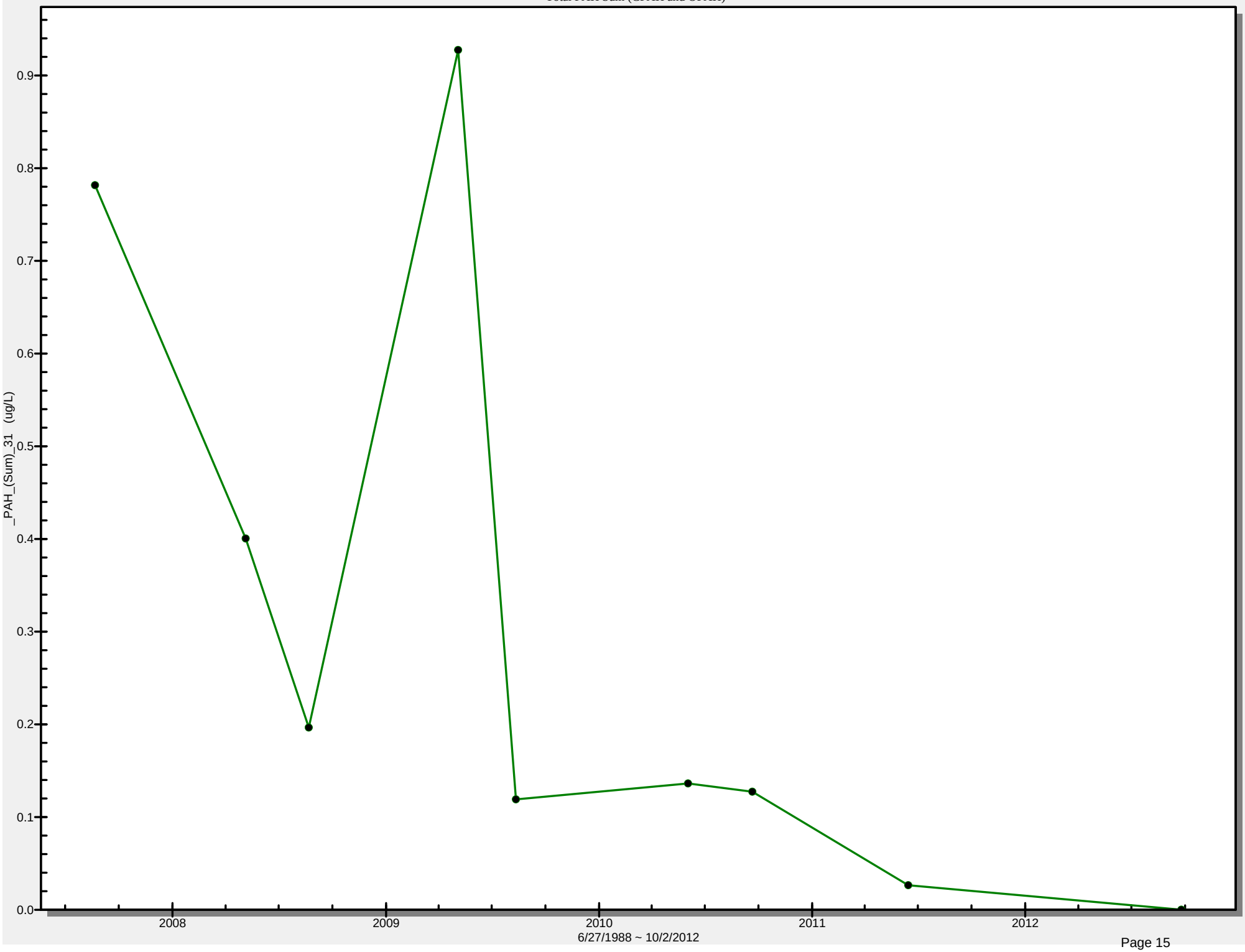
# Well W33

Total PAH Sum (CPAH and OPAH)



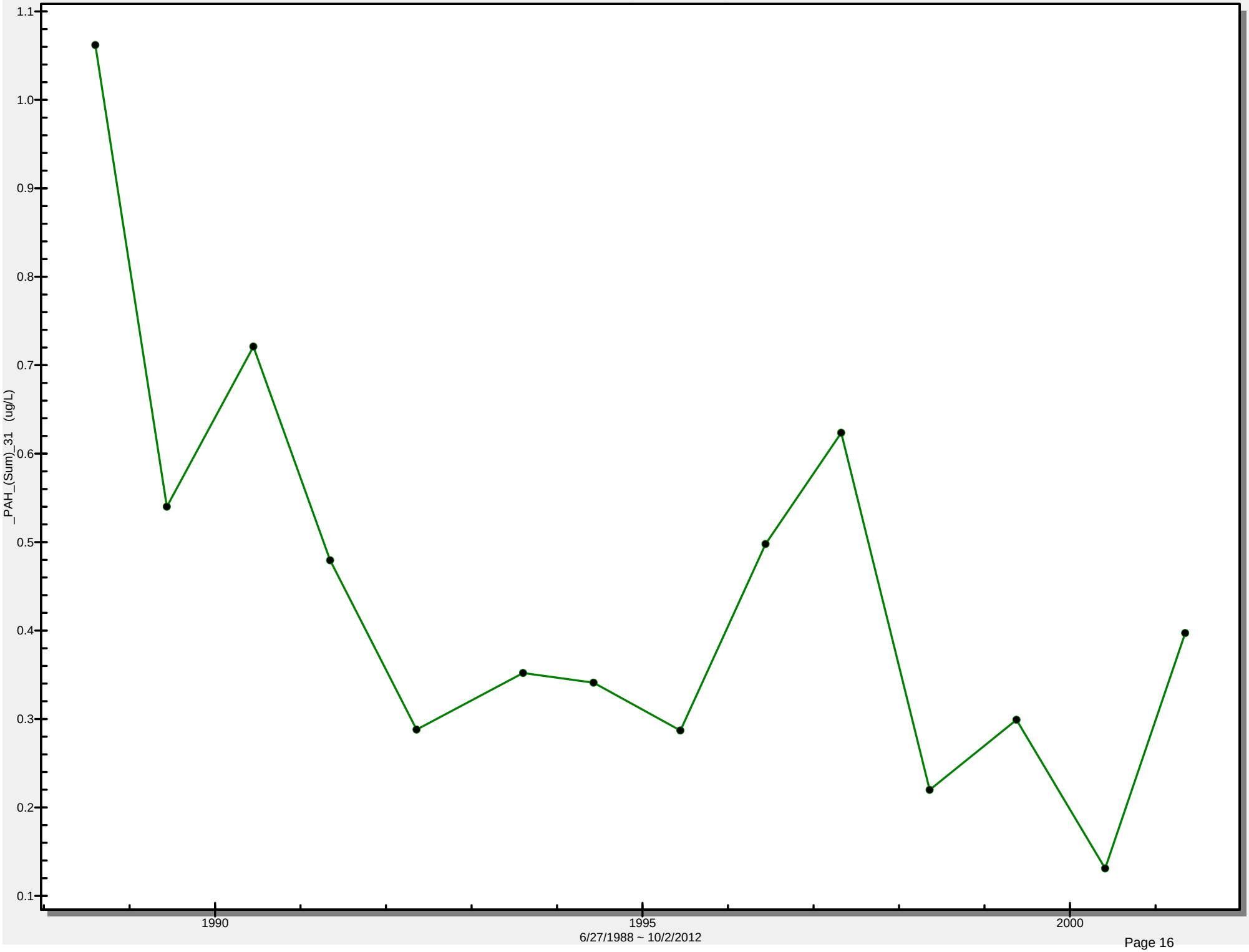
# Well W33R

Total PAH Sum (CPAH and OPAH)



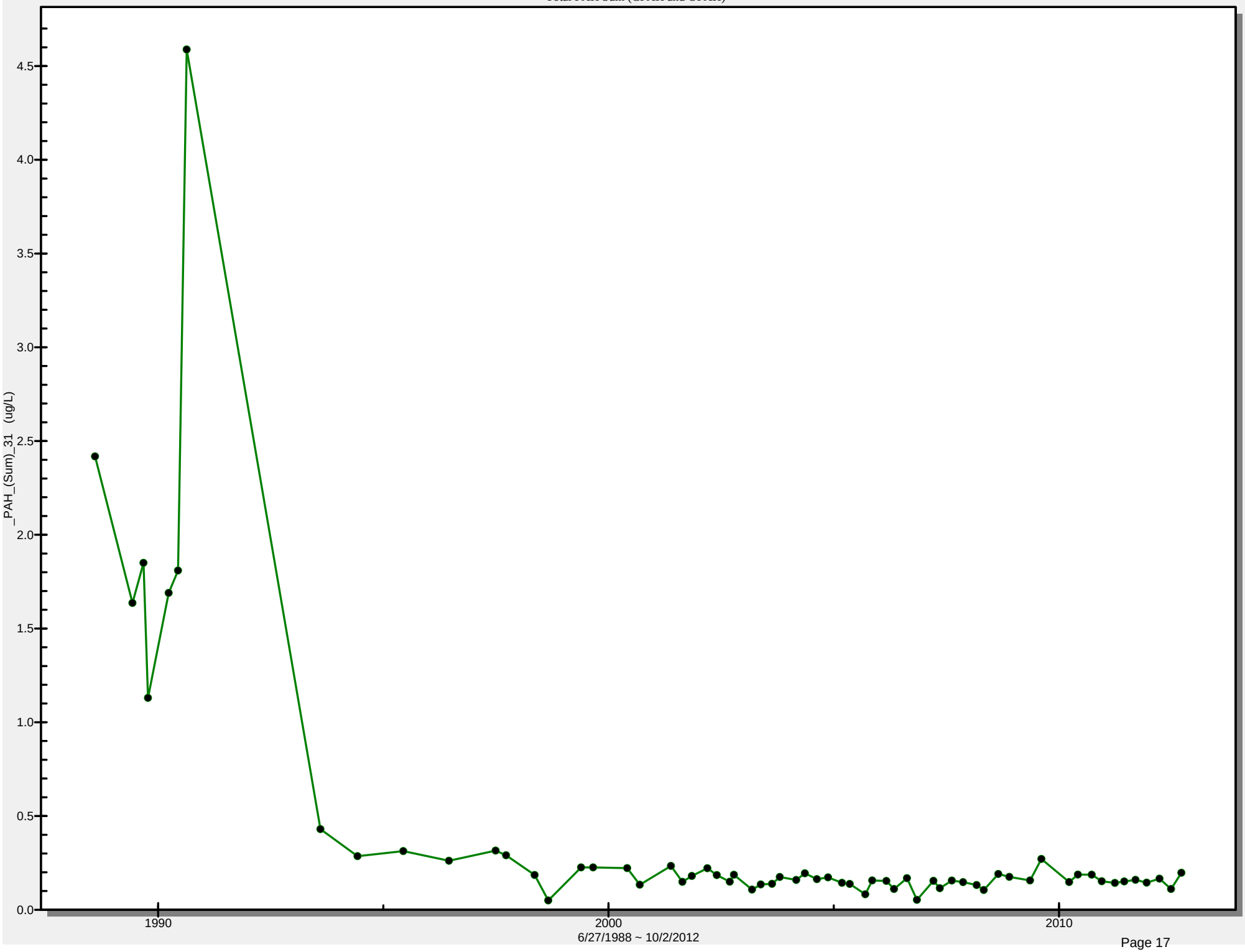
# Well W40

Total PAH Sum (CPAH and OPAH)



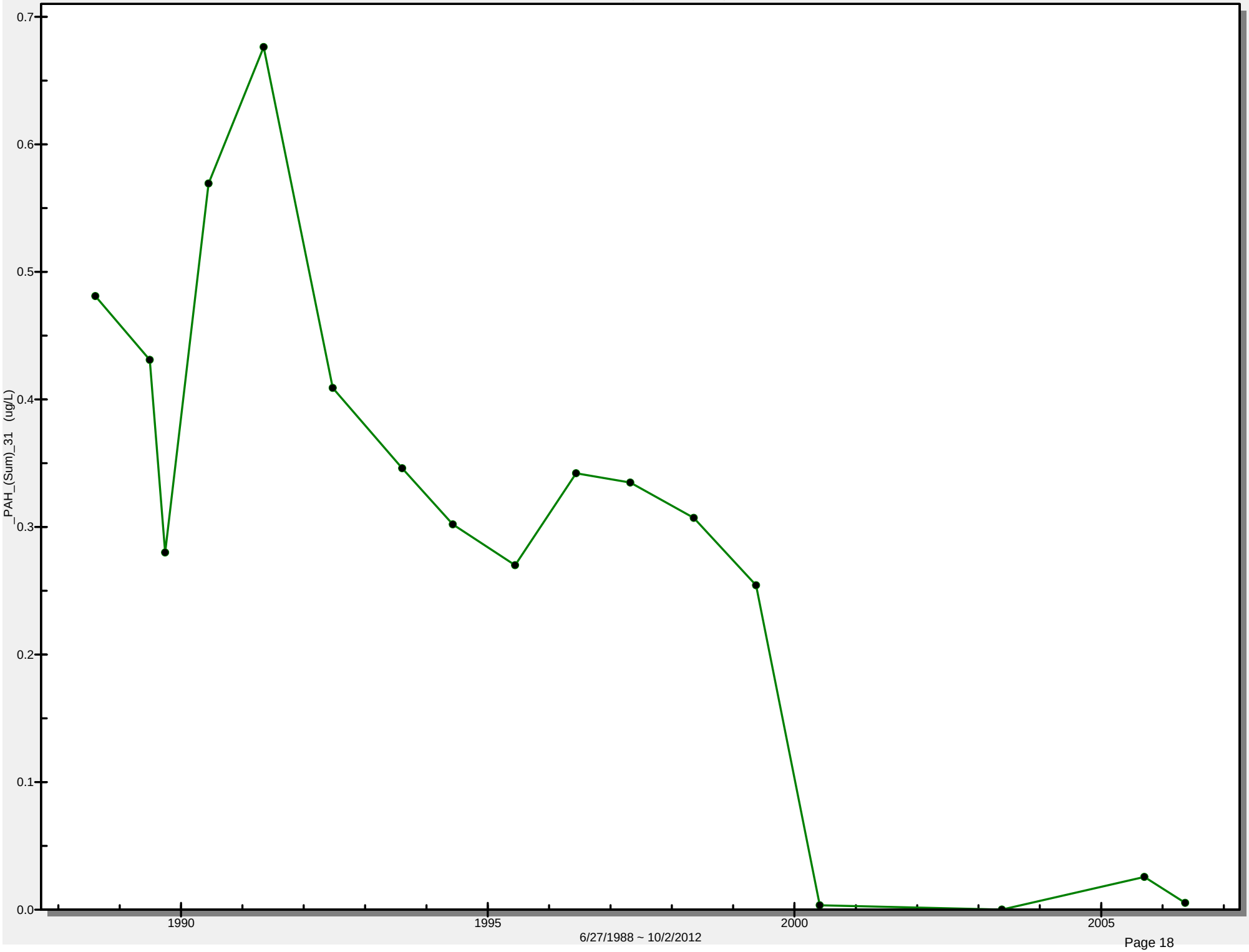
# Well W48

Total PAH Sum (CPAH and OPAH)



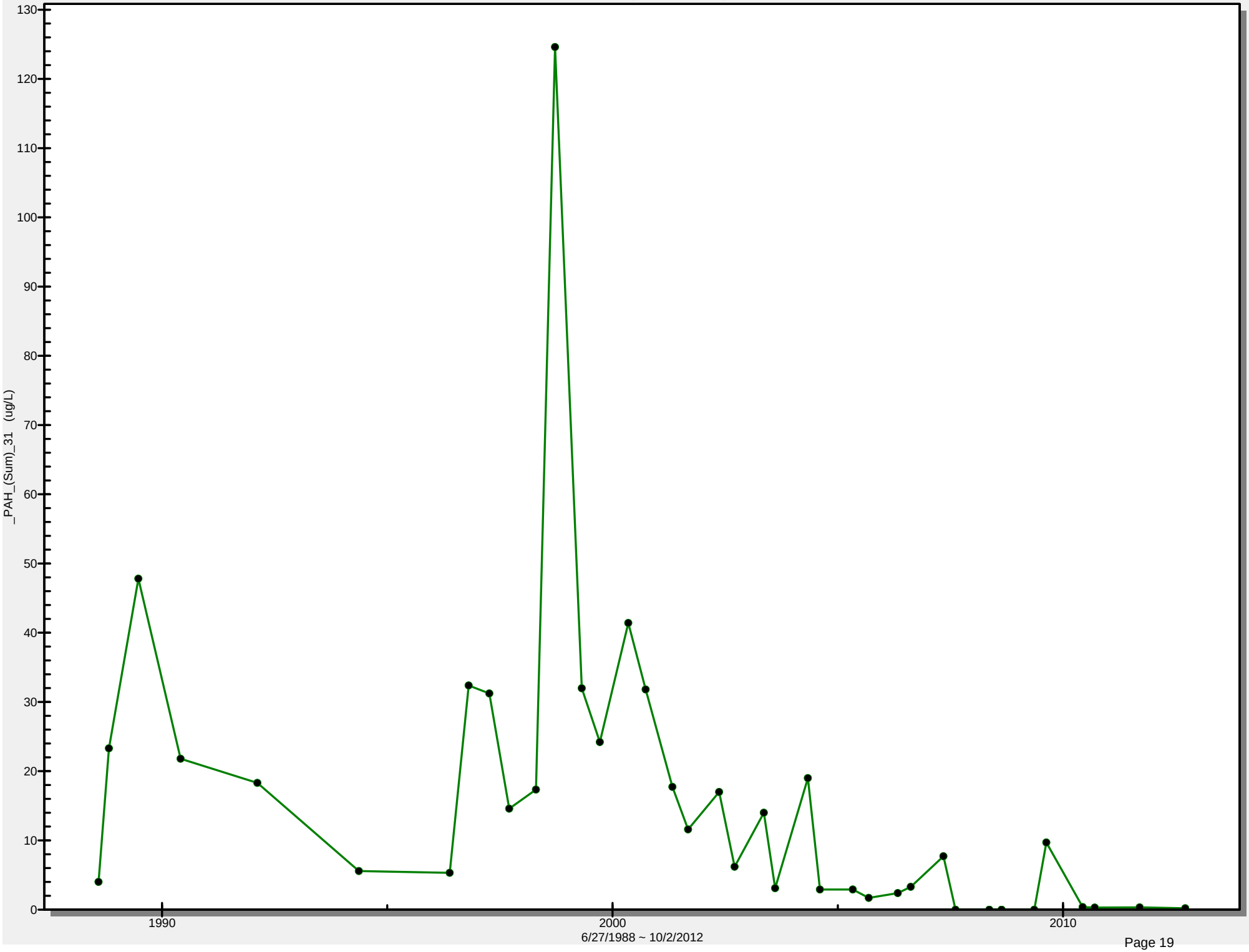
# Well W70

Total PAH Sum (CPAH and OPAH)



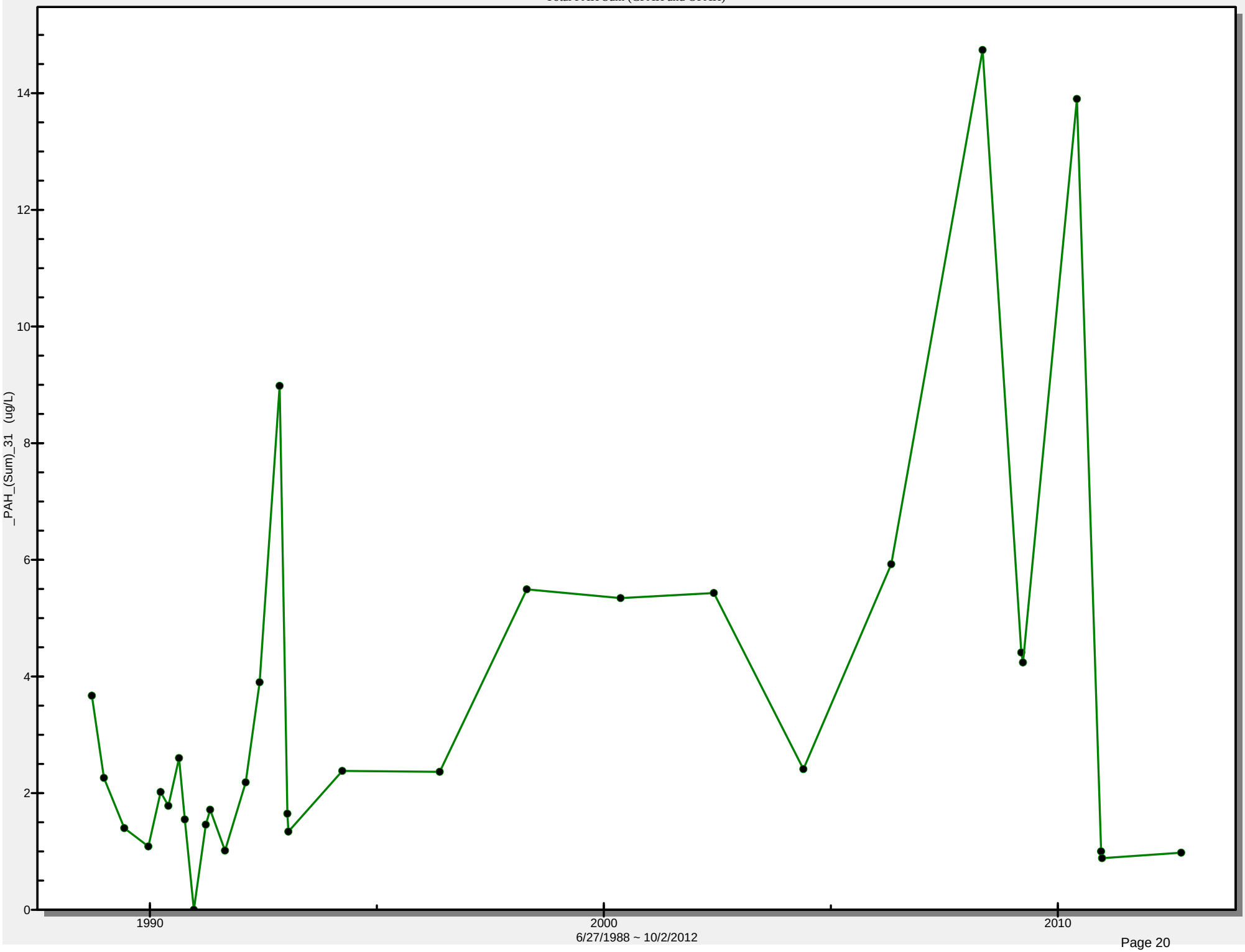
# Well W101

Total PAH Sum (CPAH and OPAH)



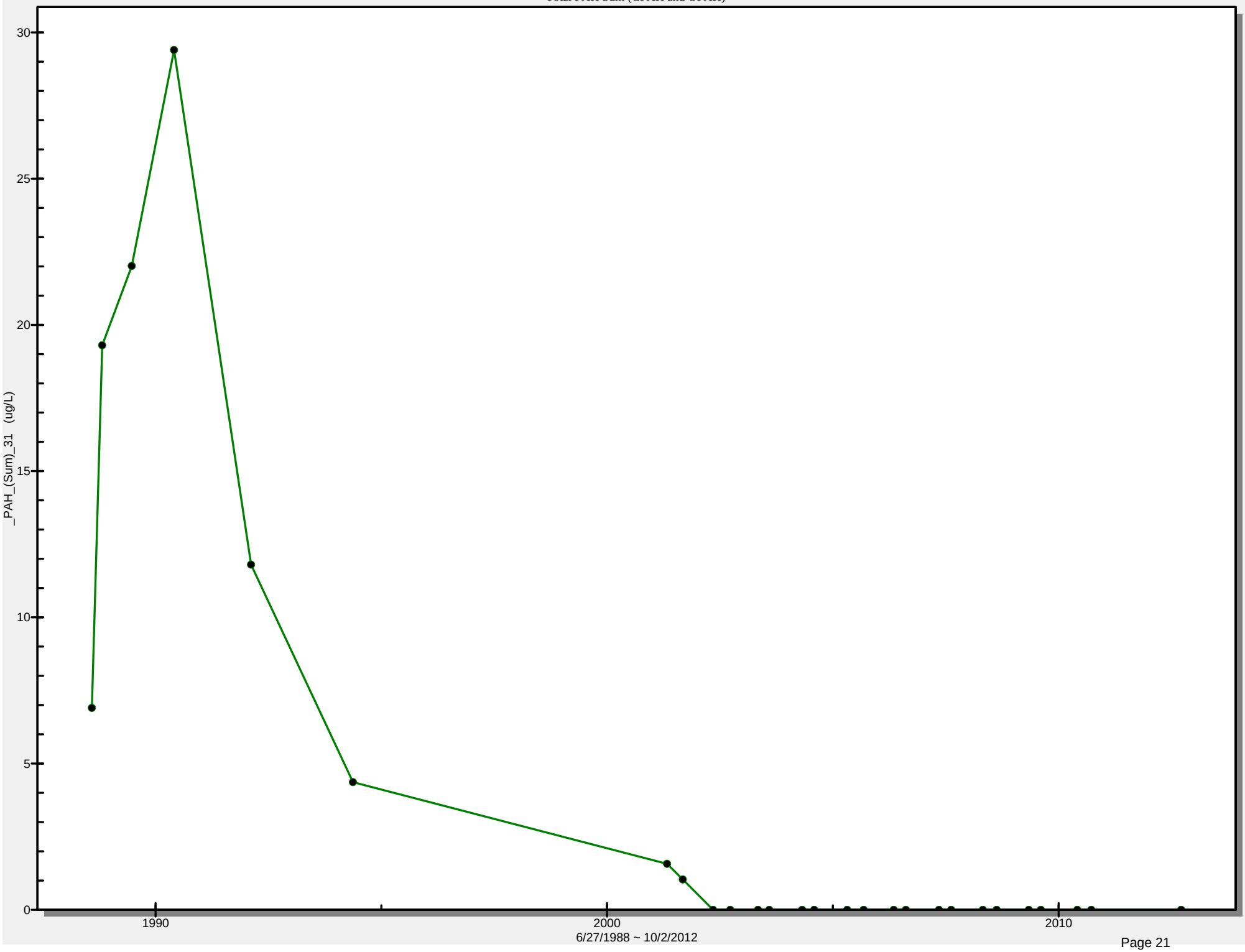
# Well W105

Total PAH Sum (CPAH and OPAH)



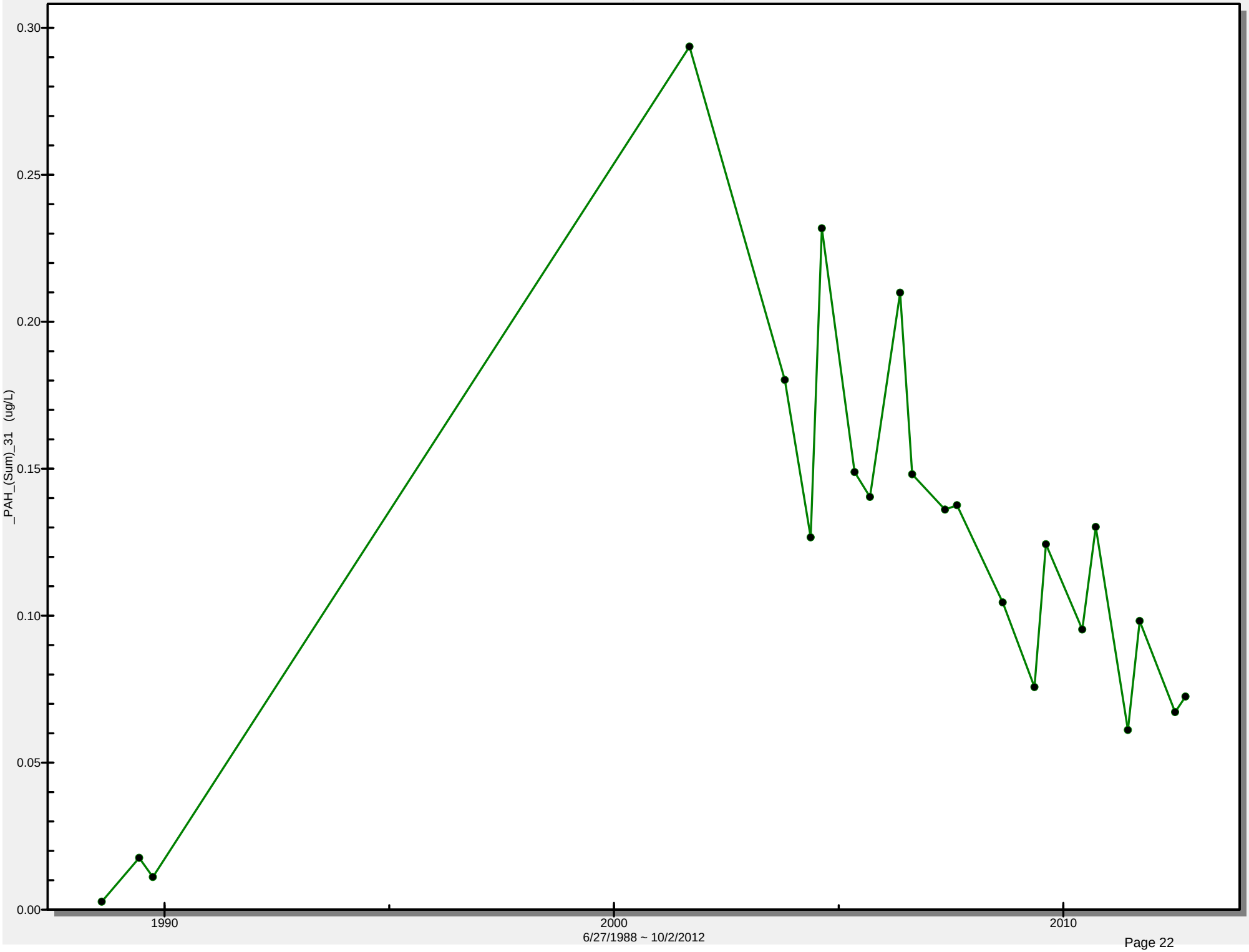
# Well W117

Total PAH Sum (CPAH and OPAH)



# Well W119

Total PAH Sum (CPAH and OPAH)



# Well W120

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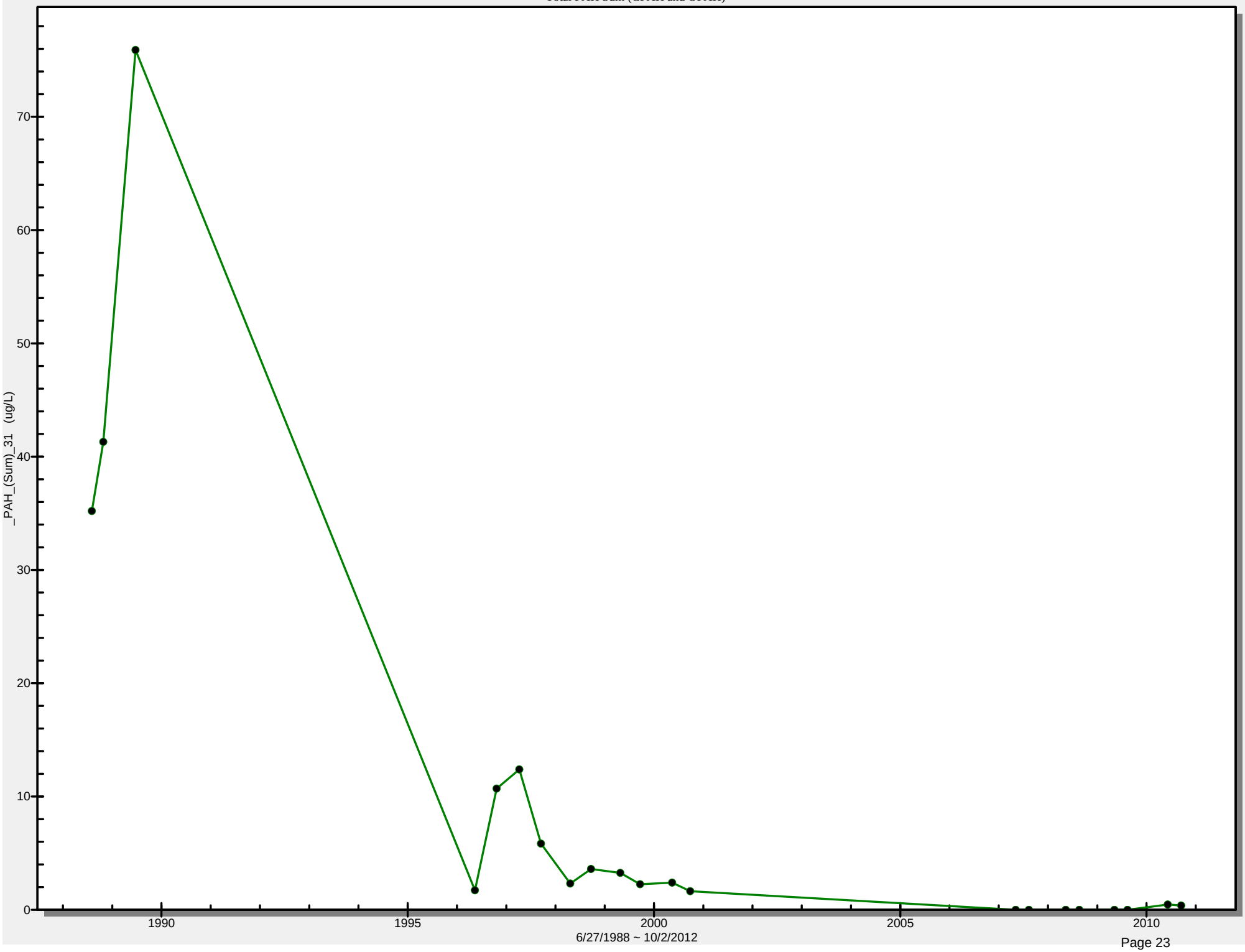
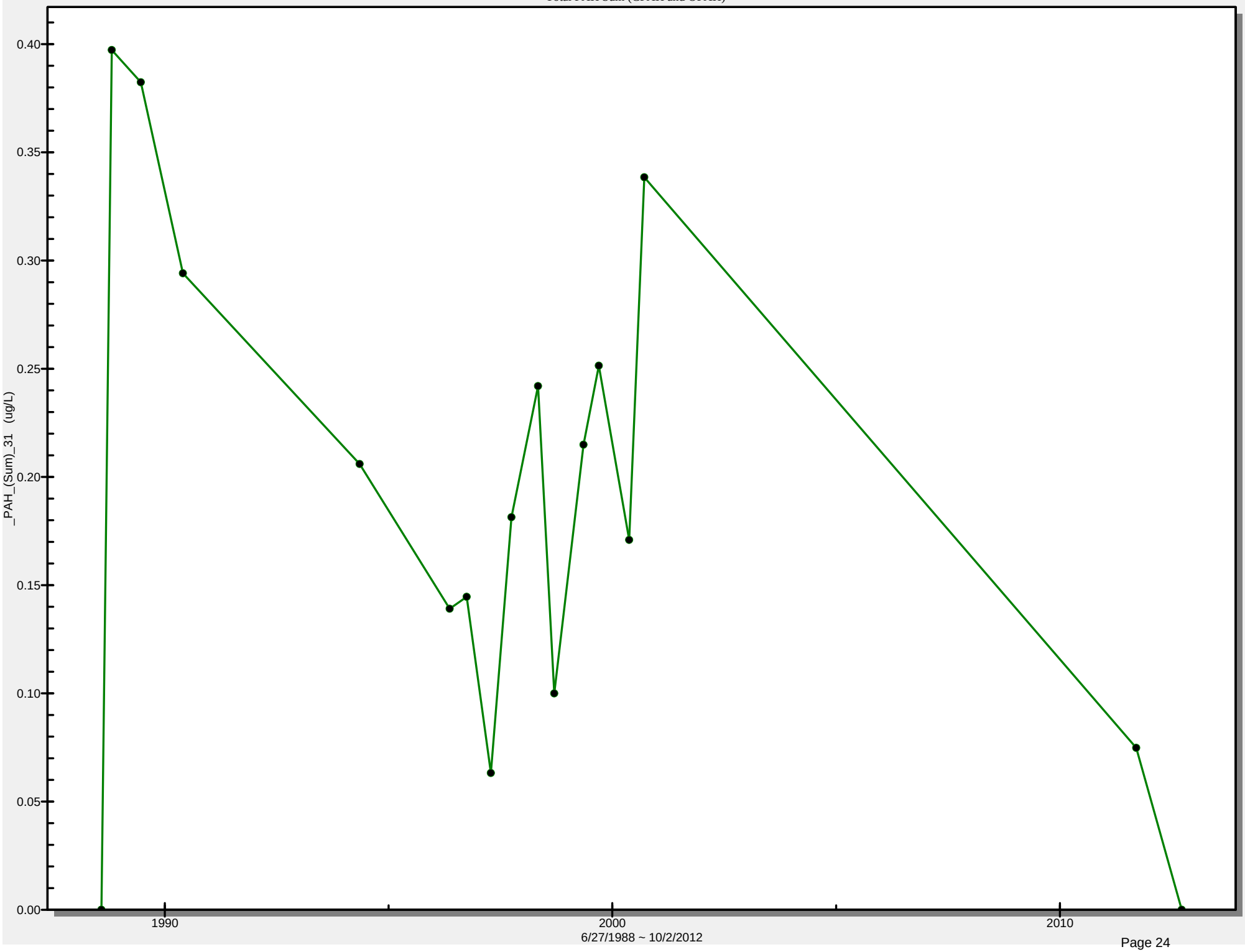


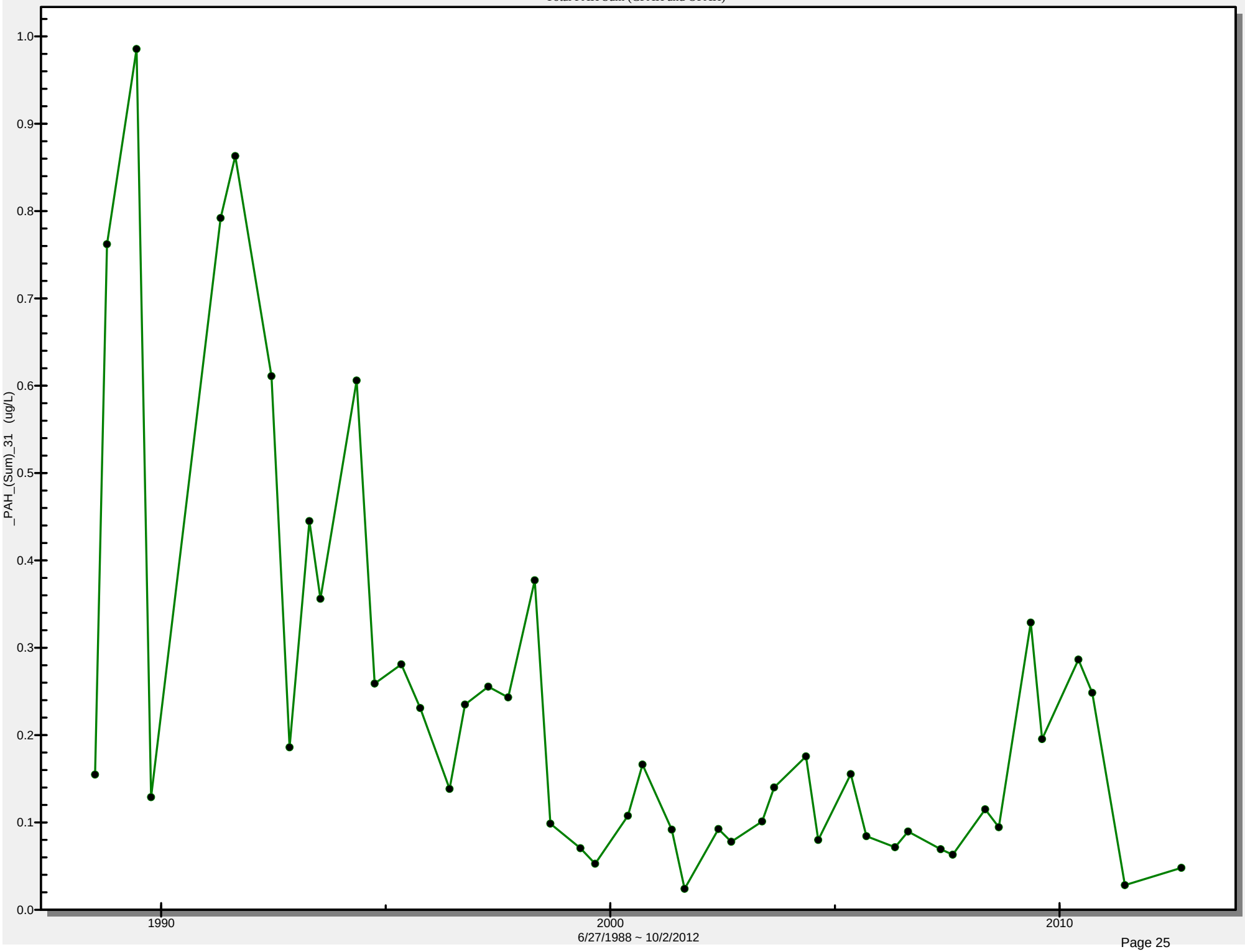
# Well W121

Total PAH Sum (CPAH and OPAH)



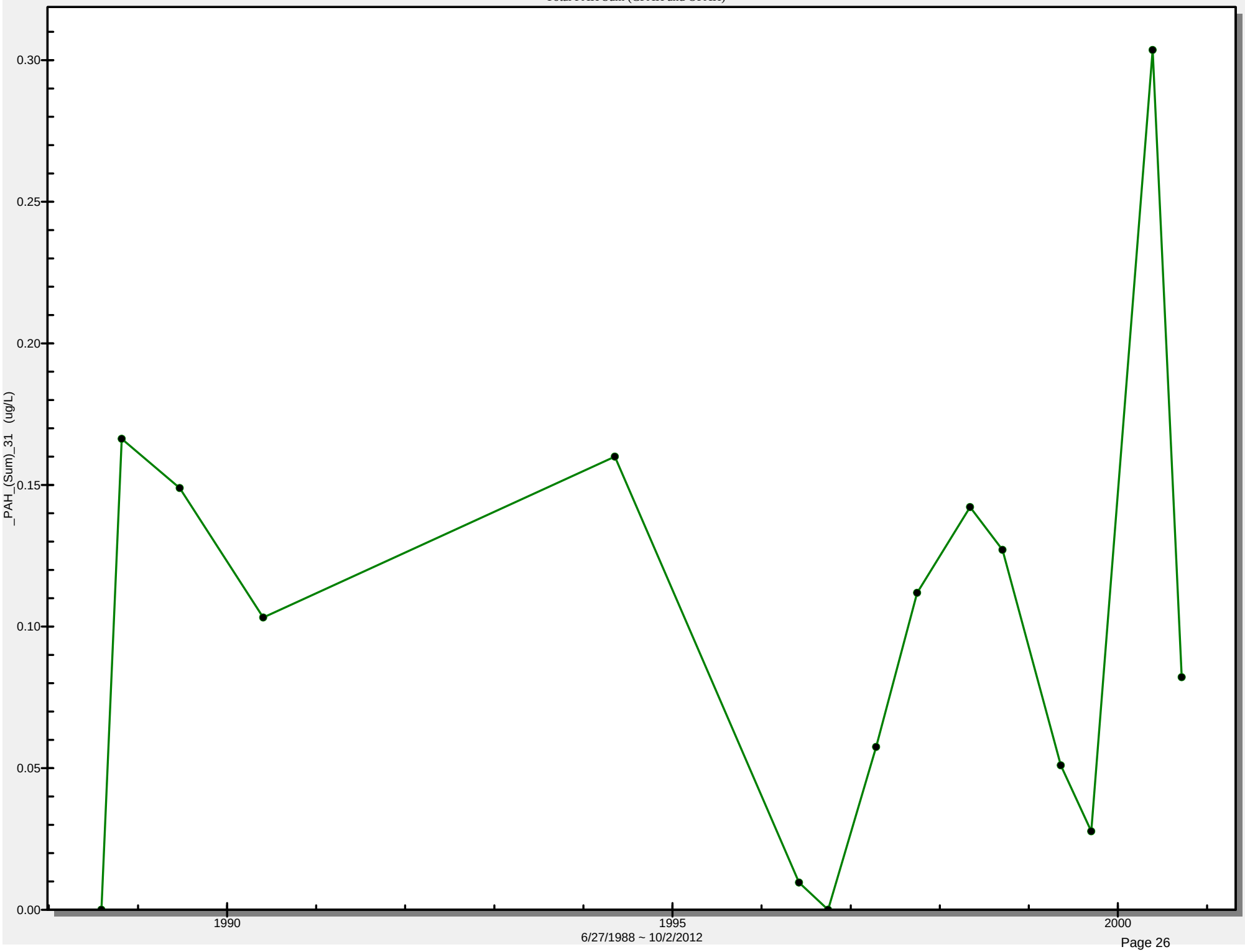
# Well W122

Total PAH Sum (CPAH and OPAH)



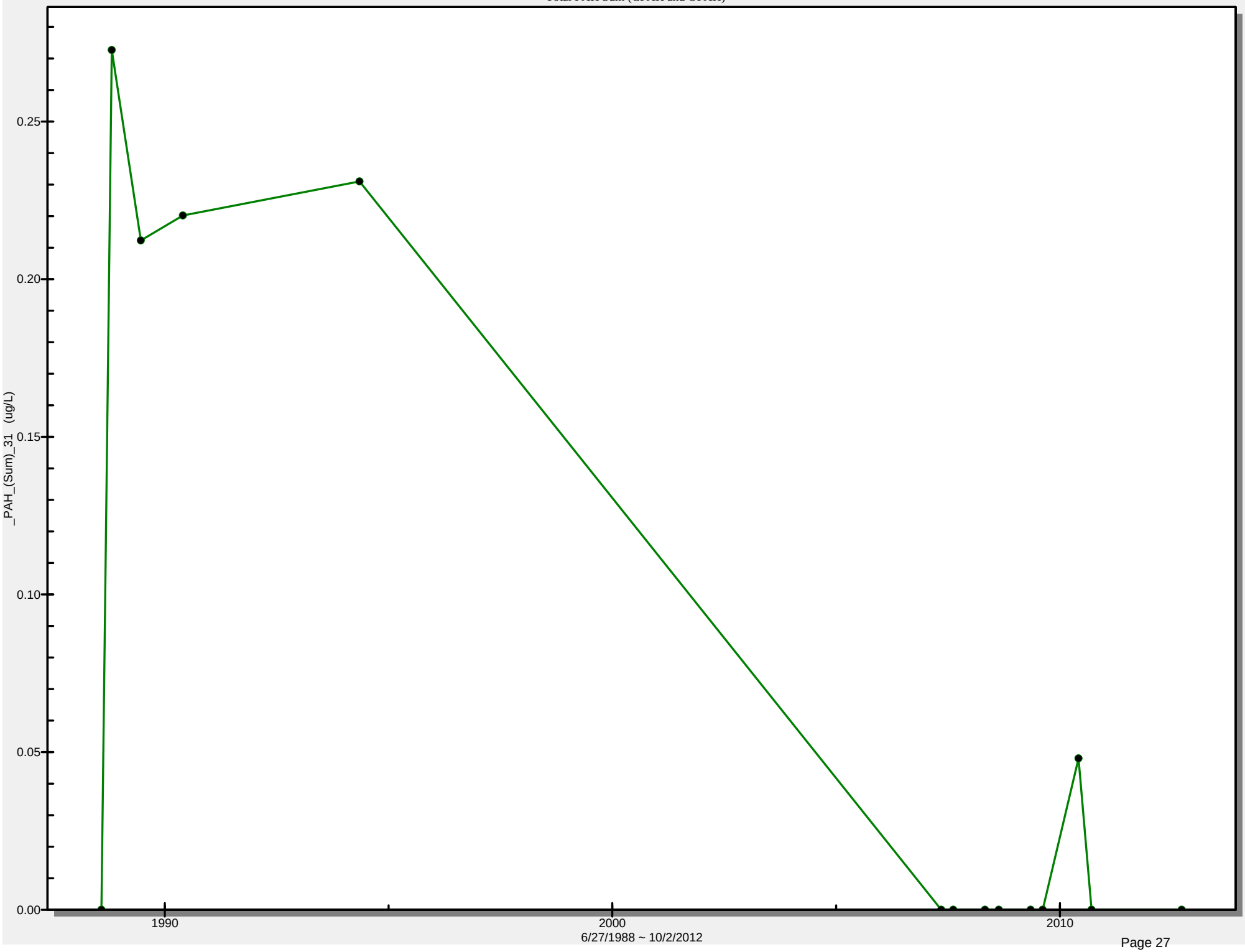
# Well W124

Total PAH Sum (CPAH and OPAH)



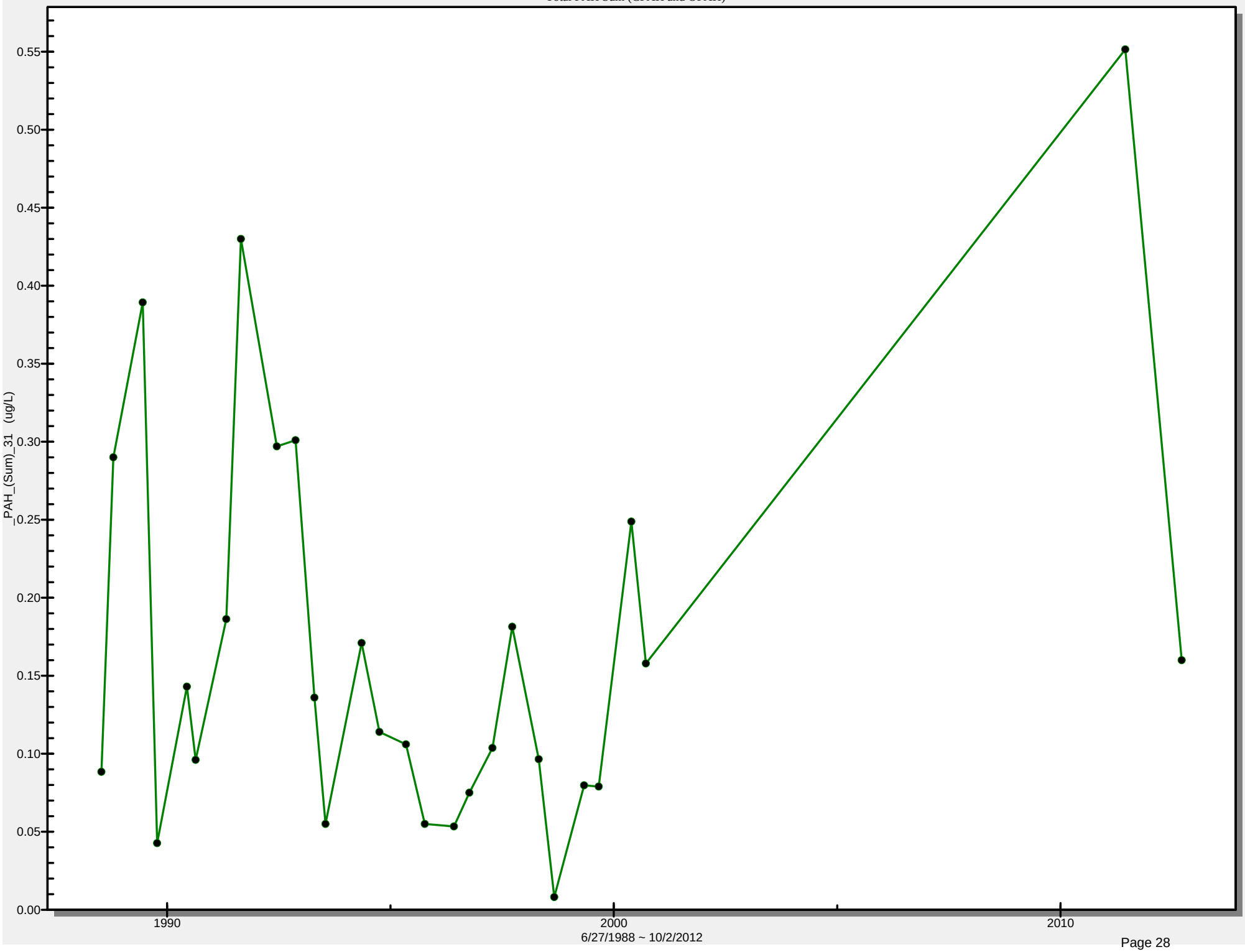
# Well W128

Total PAH Sum (CPAH and OPAH)



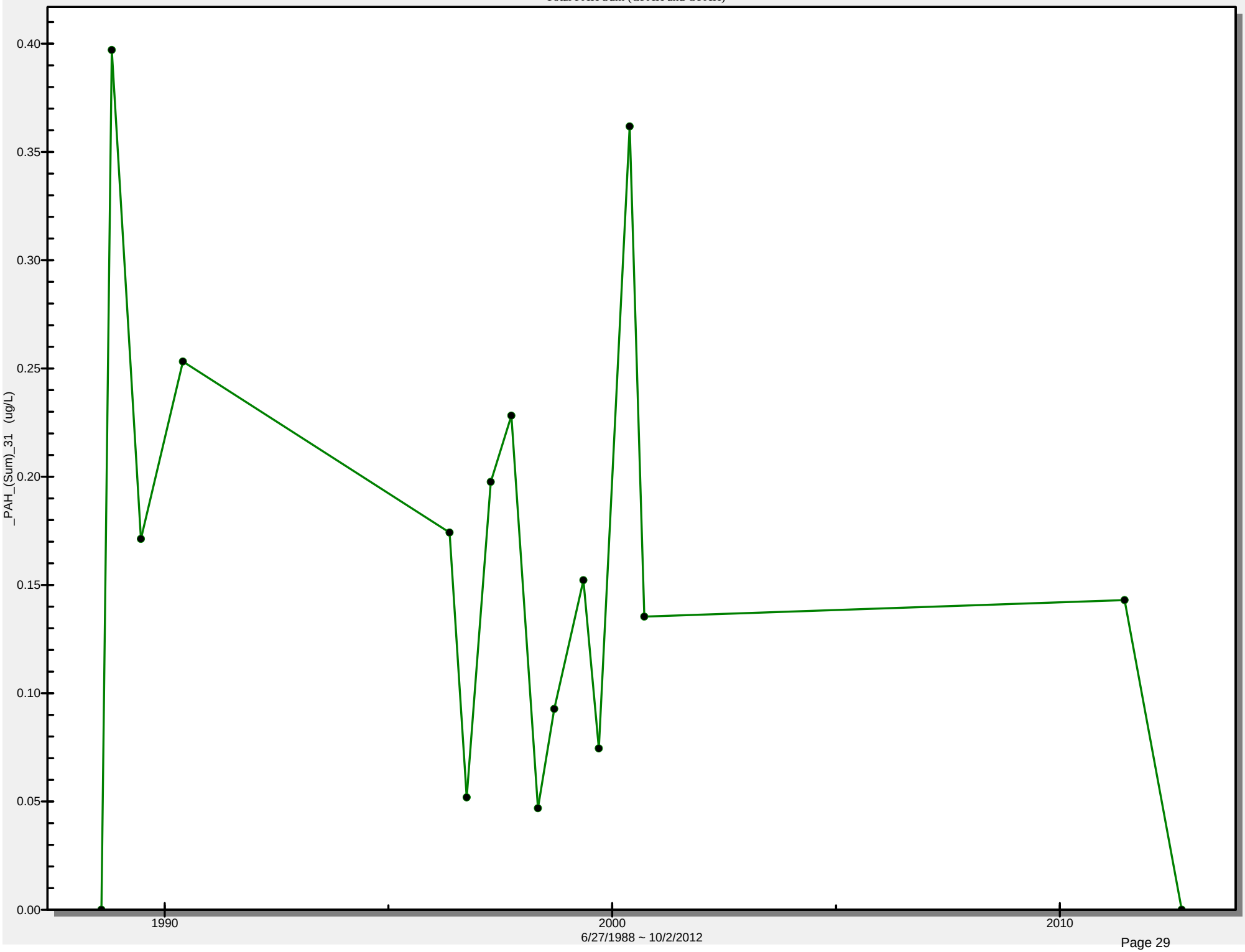
# Well W129

Total PAH Sum (CPAH and OPAH)



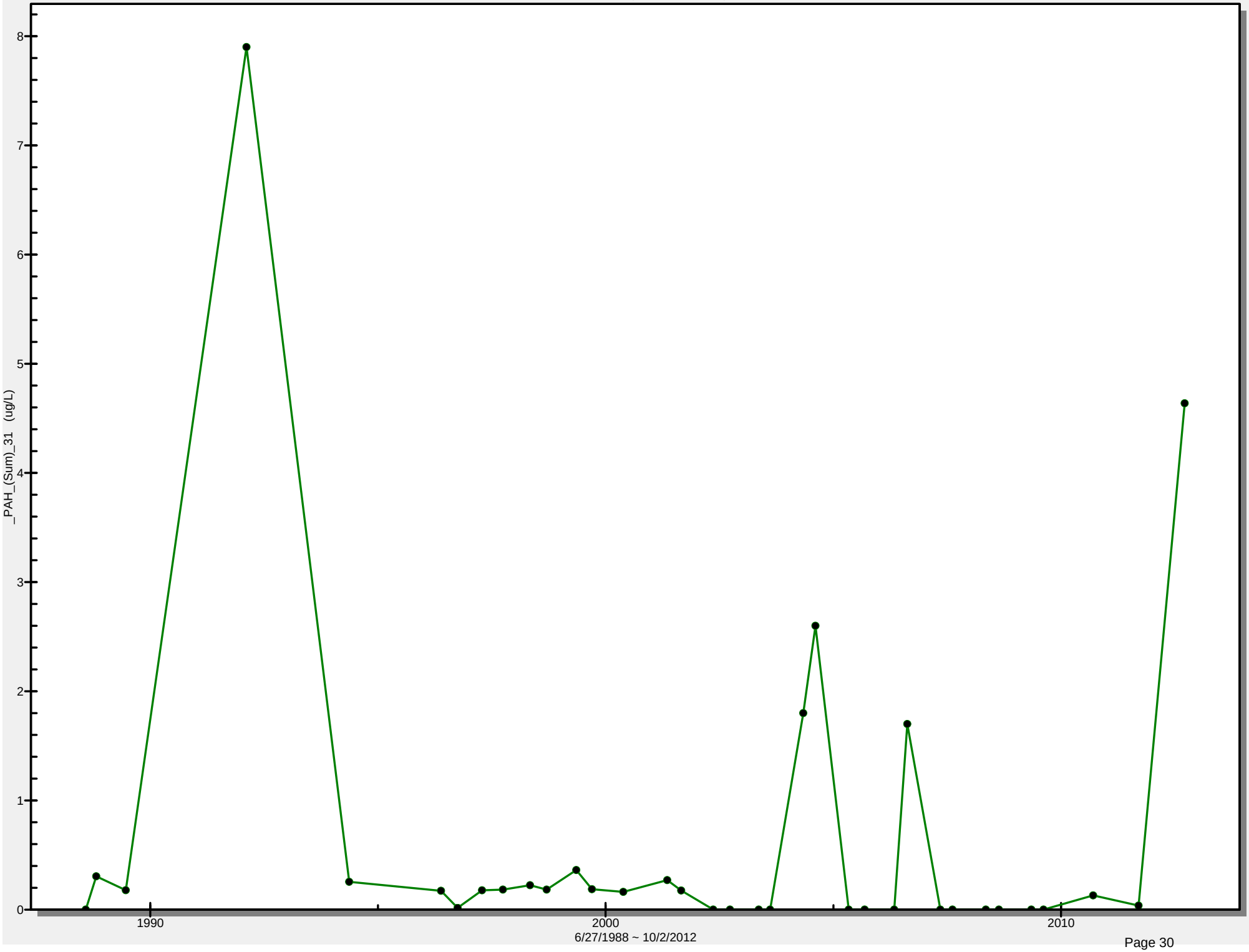
# Well W130

Total PAH Sum (CPAH and OPAH)



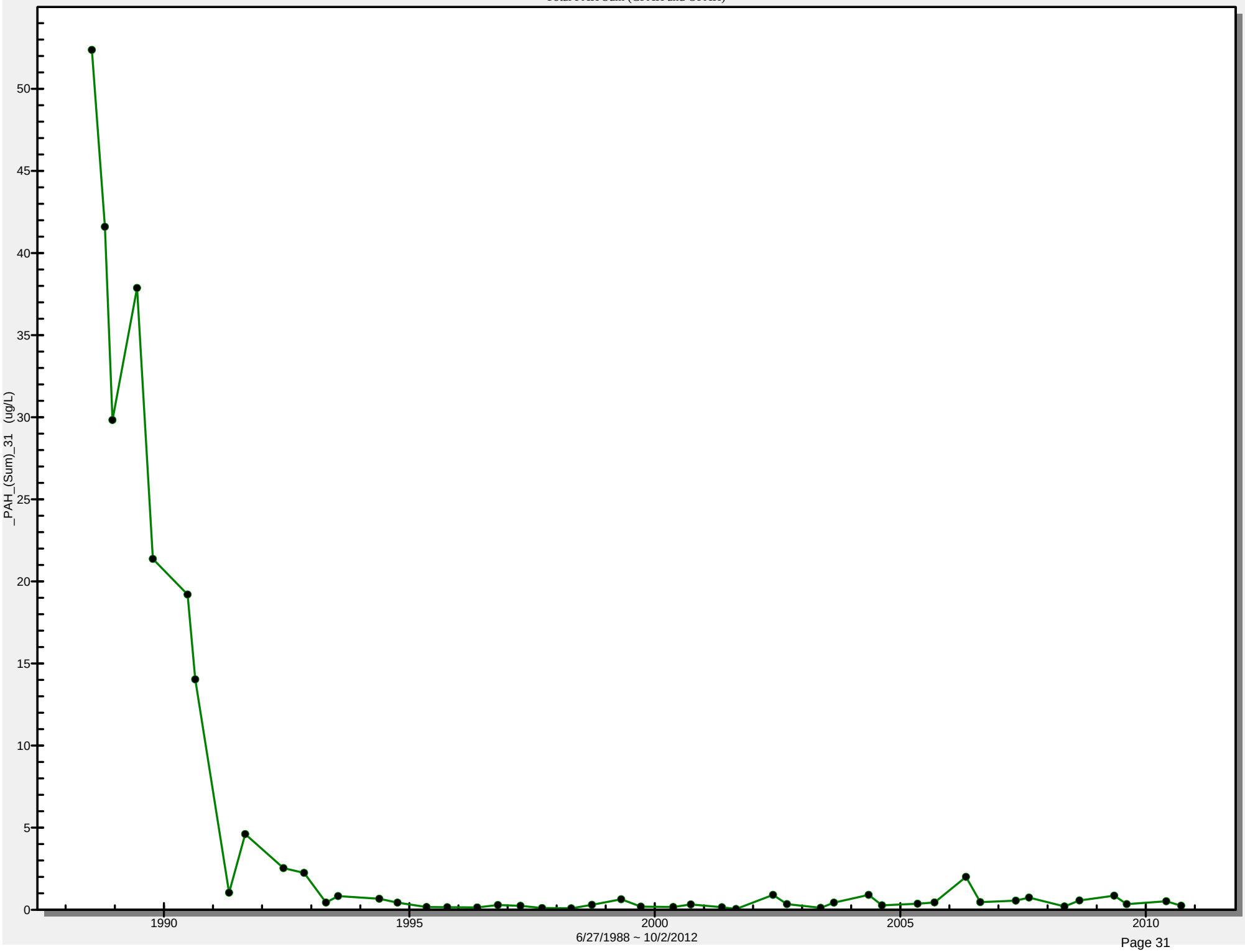
# Well W131

Total PAH Sum (CPAH and OPAH)



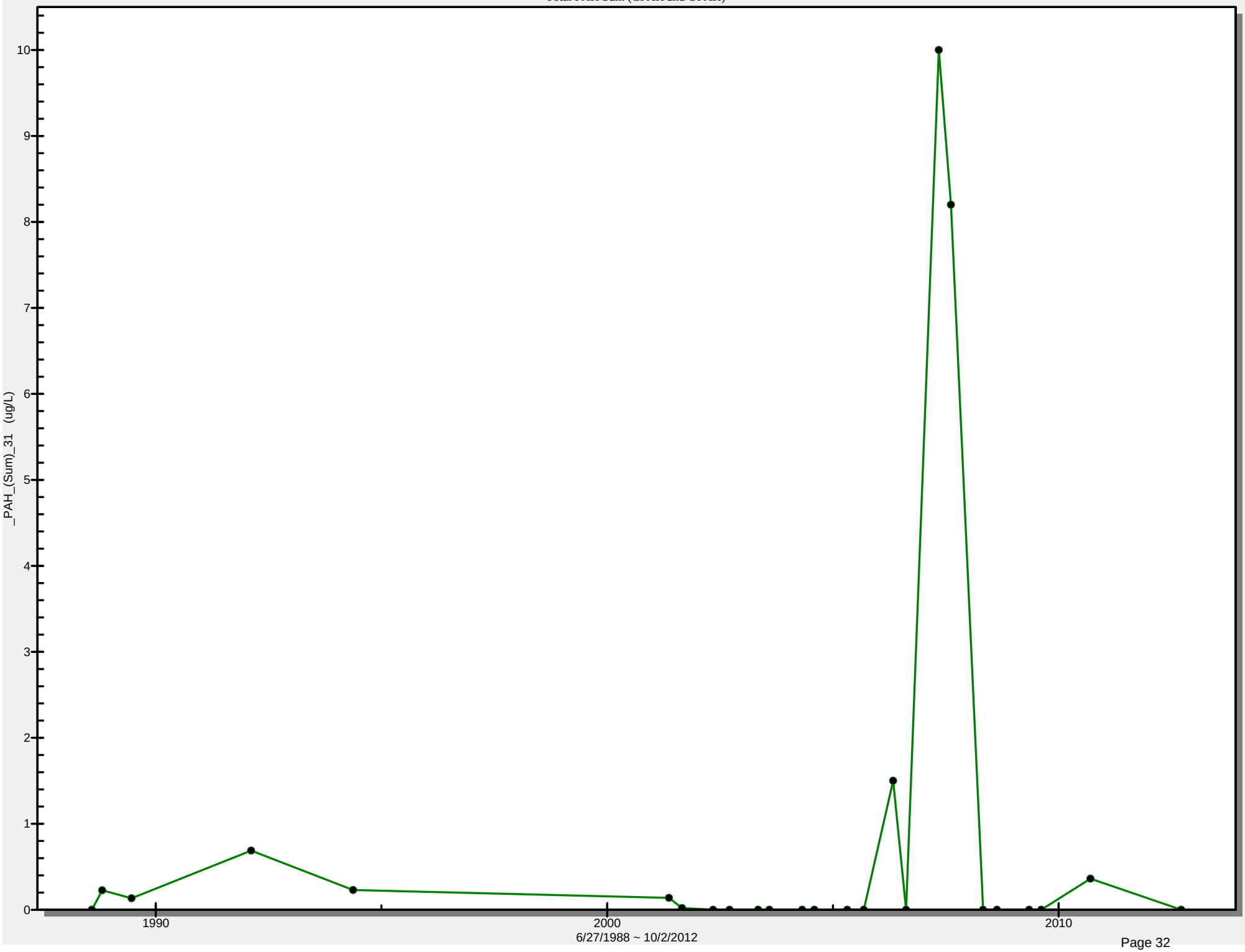
# Well W133

Total PAH Sum (CPAH and OPAH)



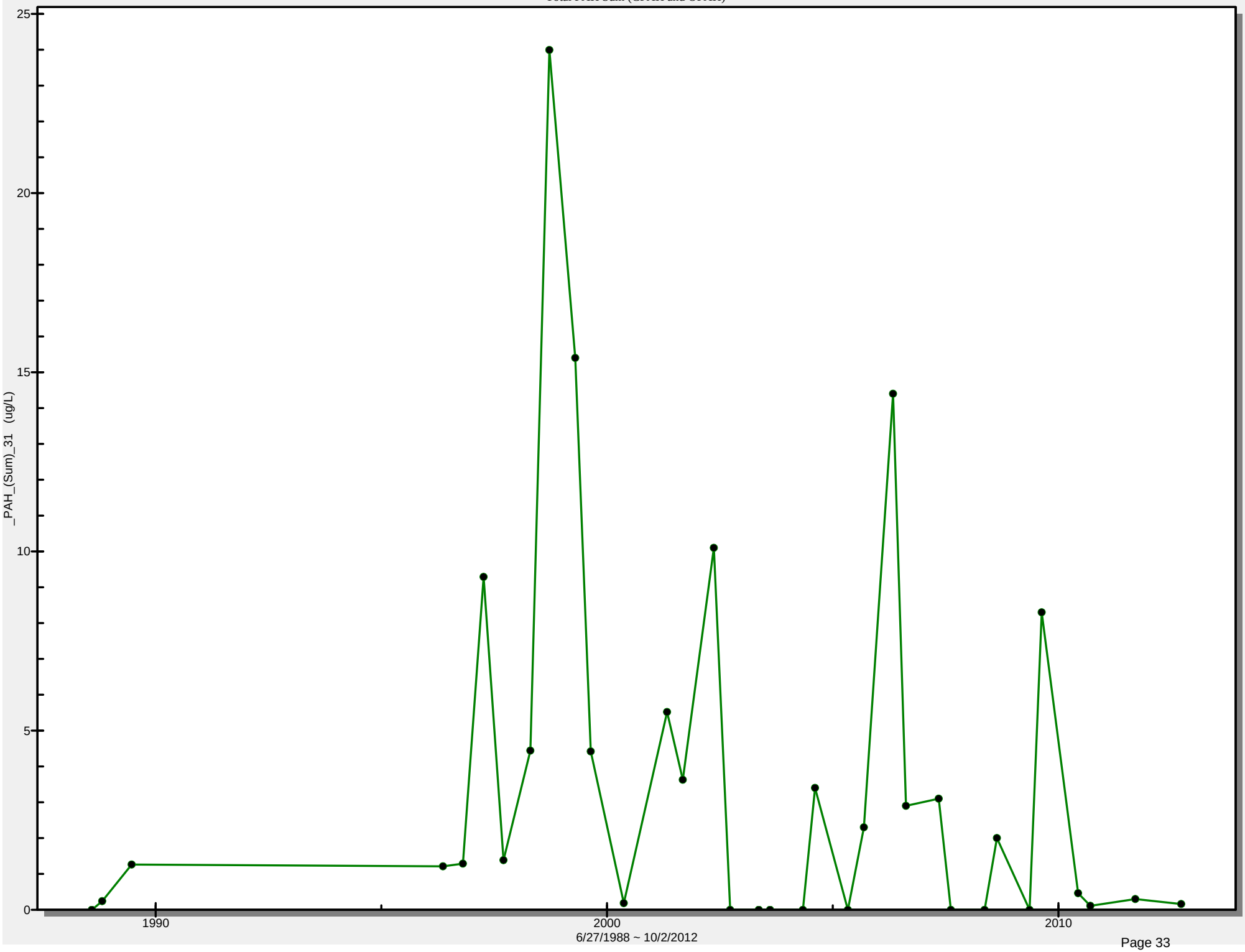
# Well W136

Total PAH Sum (CPAH and OPAH)



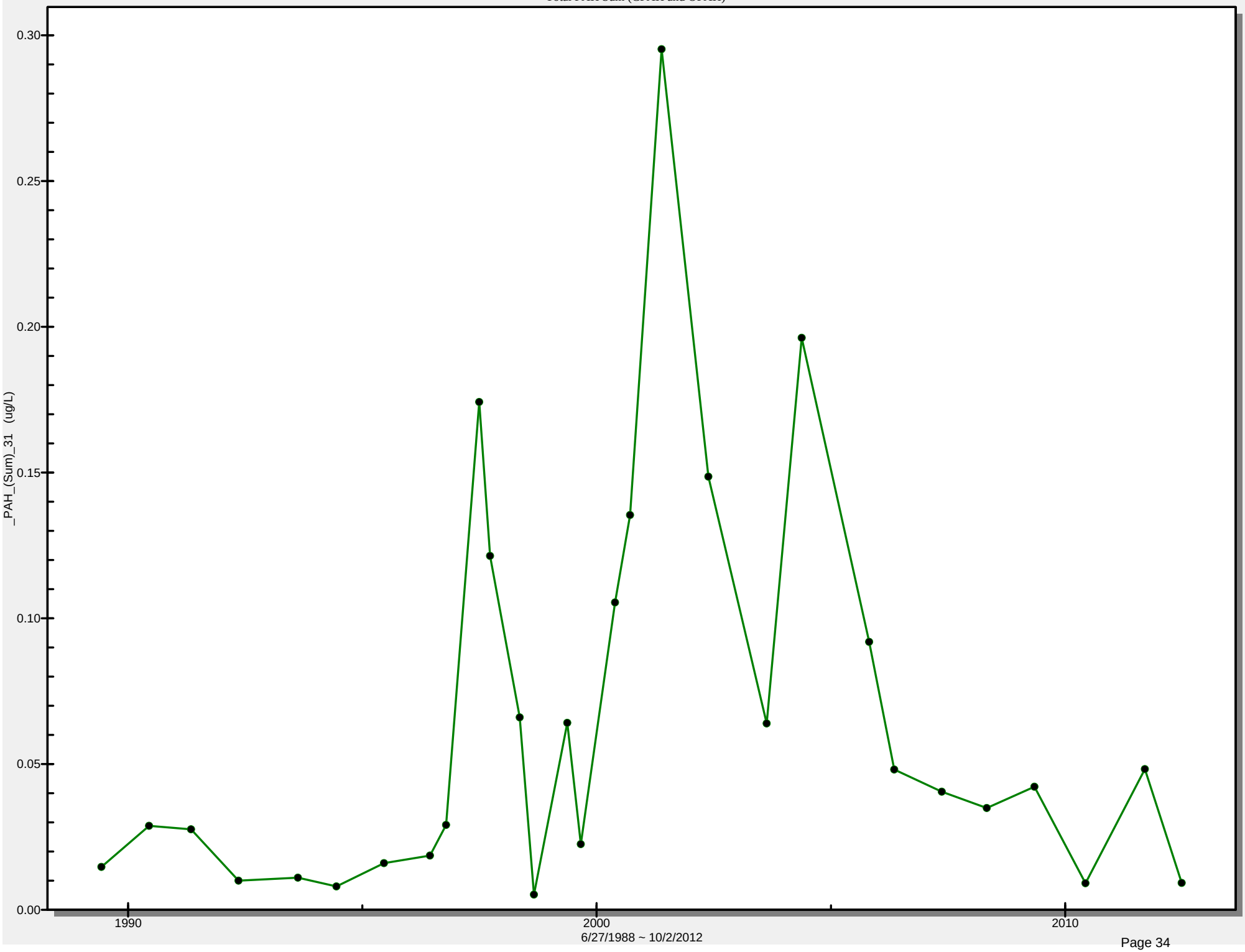
# Well W143

Total PAH Sum (CPAH and OPAH)



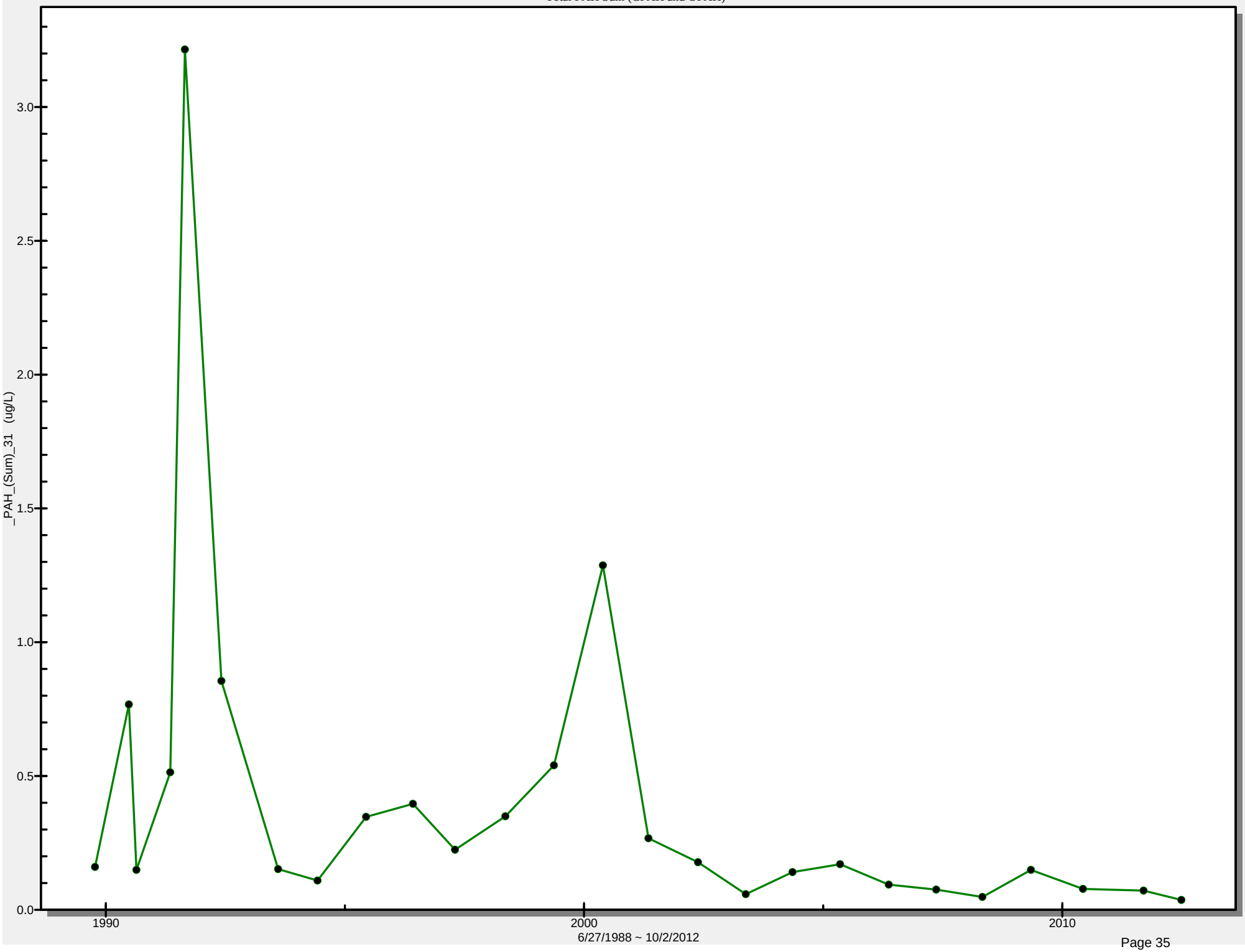
# Well W401

Total PAH Sum (CPAH and OPAH)



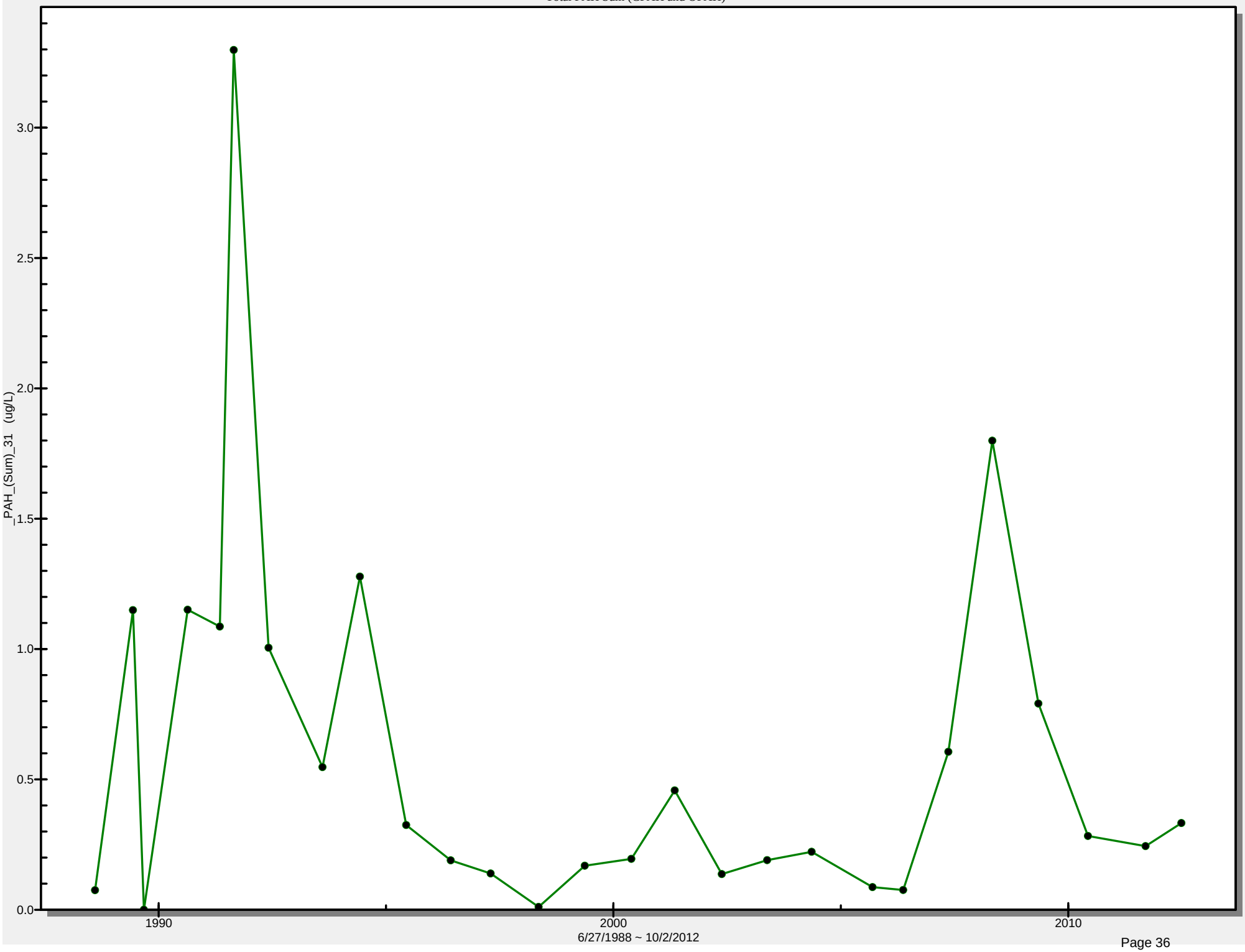
# Welll W402

Total PAH Sum (CPAH and OPAH)



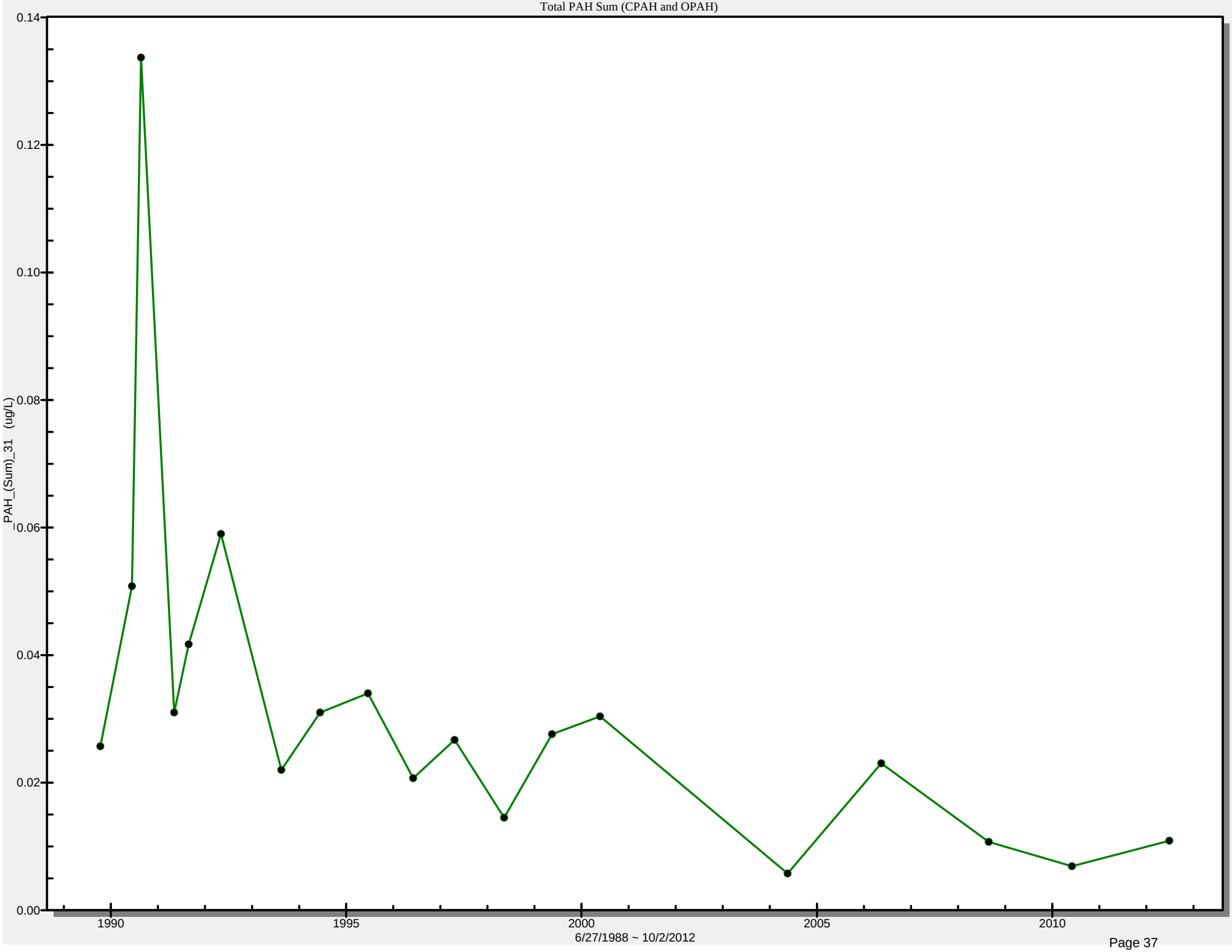
# Well W403

Total PAH Sum (CPAH and OPAH)



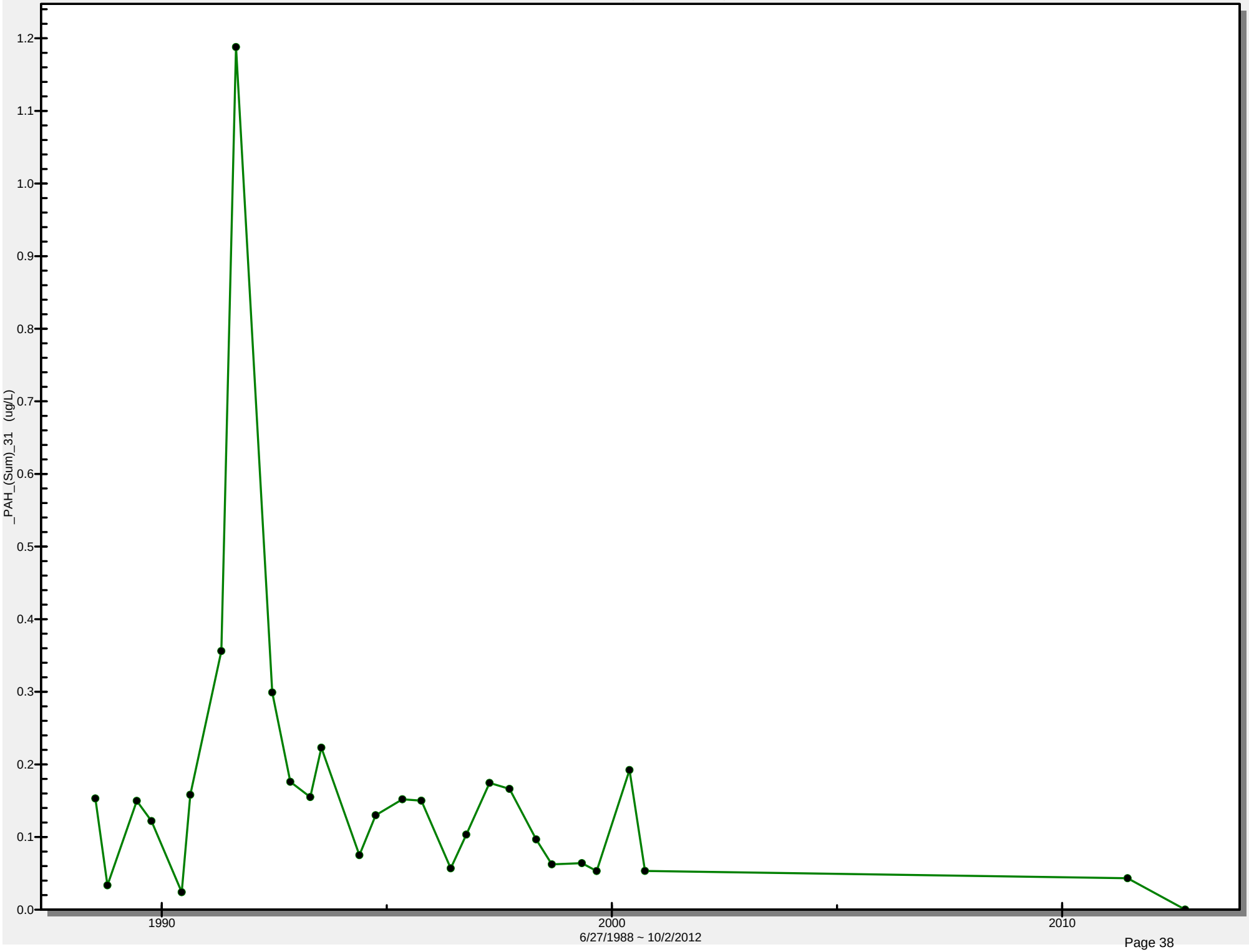
# Well W406

Total PAH Sum (CPAH and OPAH)



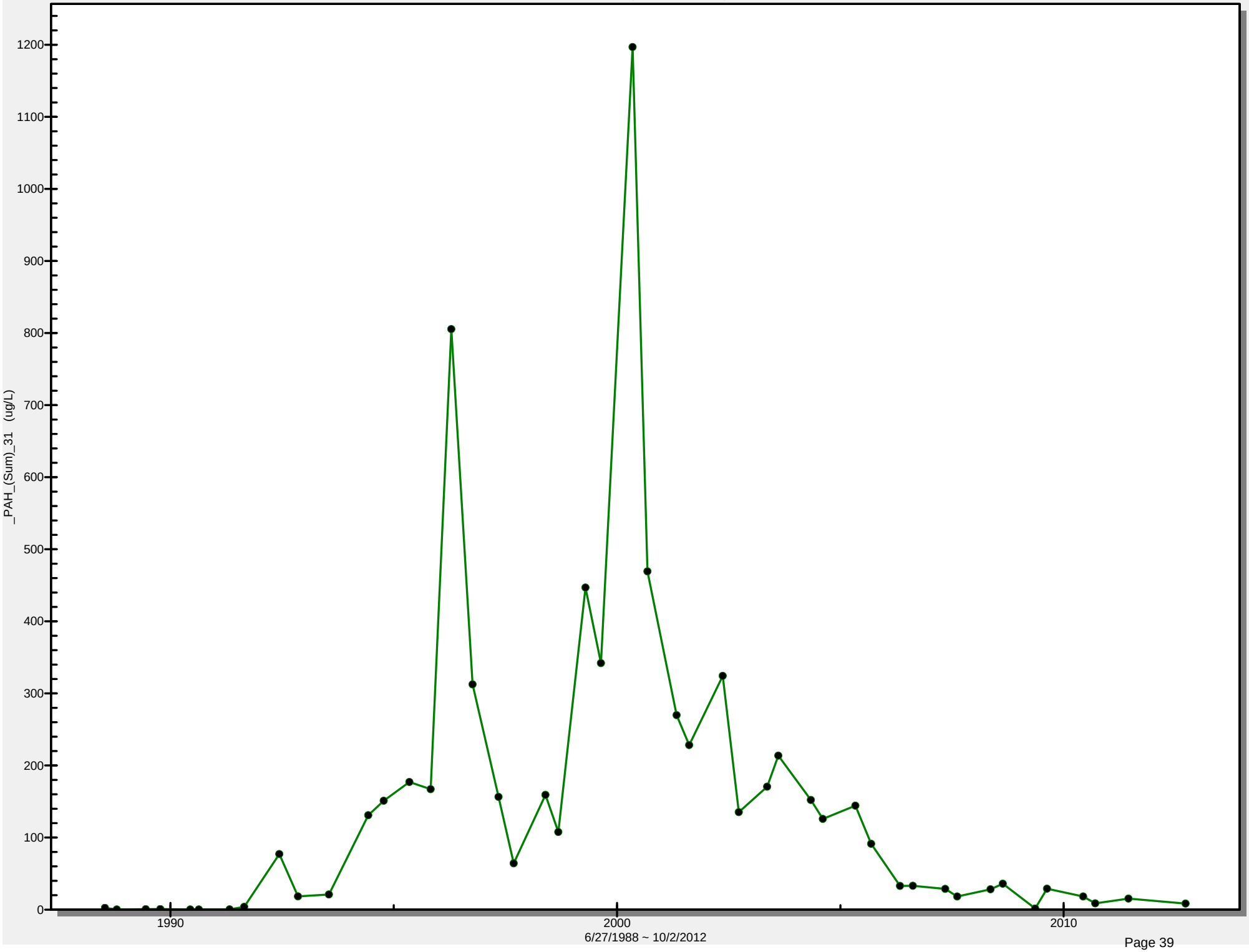
# Well W408

Total PAH Sum (CPAH and OPAH)



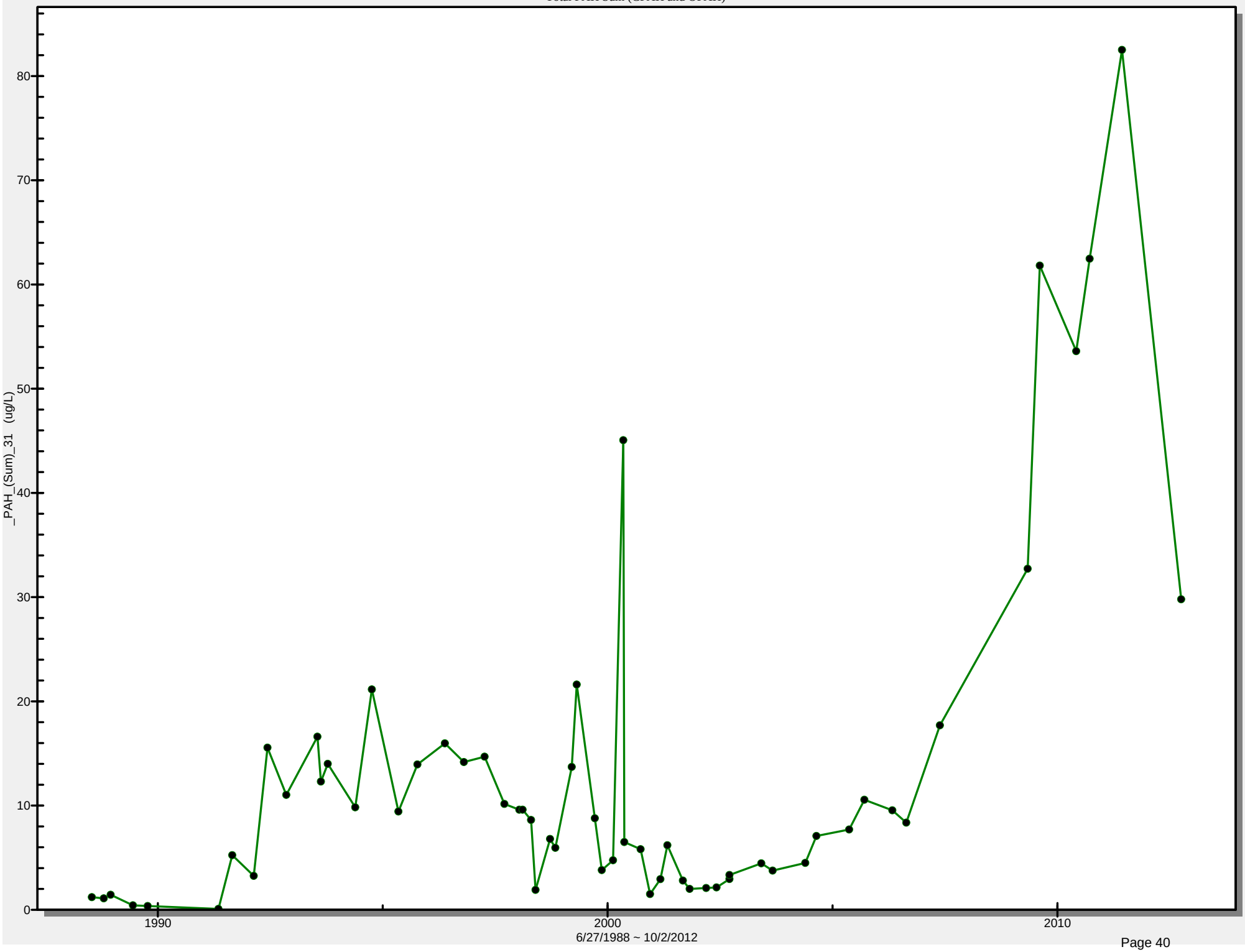
# Well W409

Total PAH Sum (CPAH and OPAH)



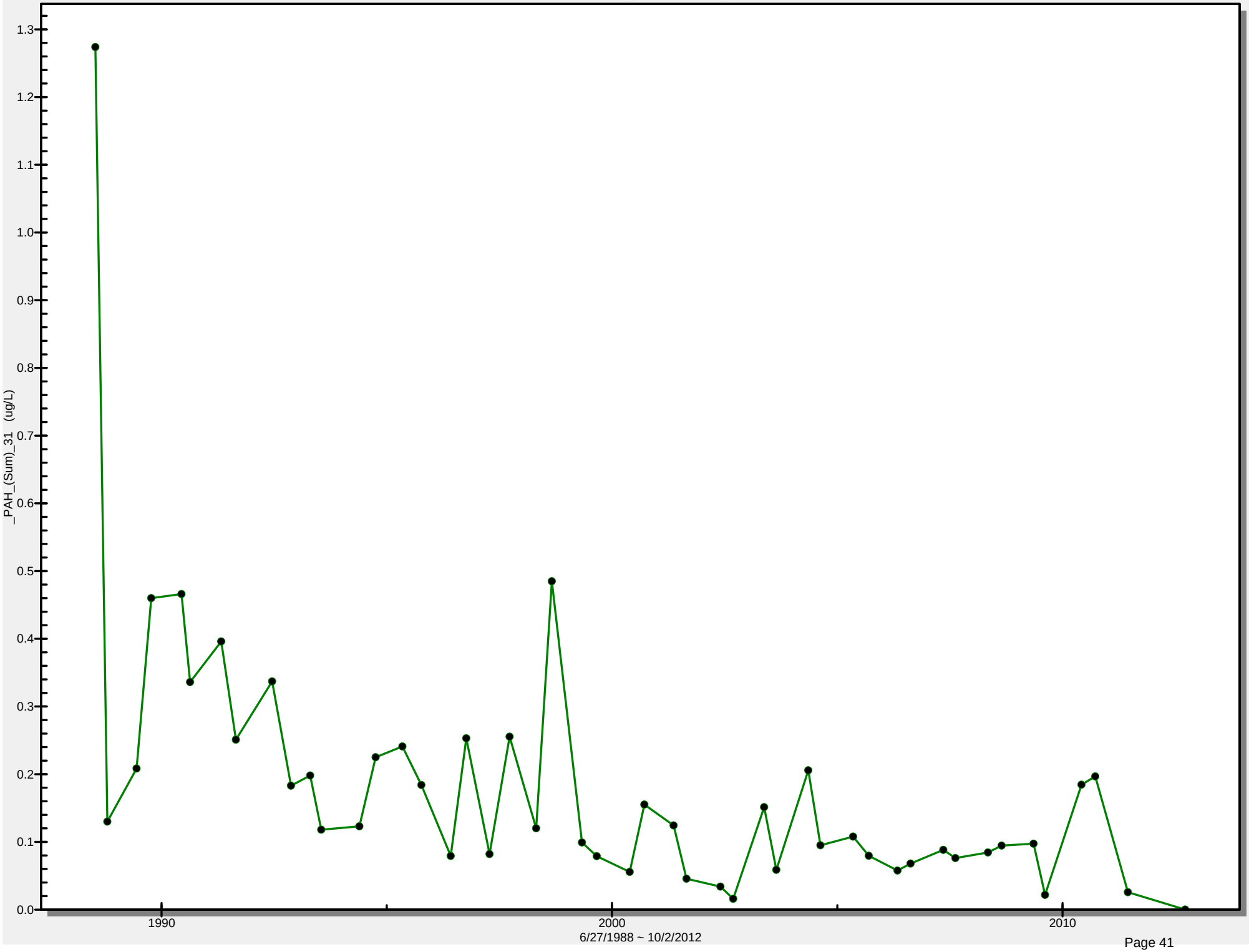
# Well W410

Total PAH Sum (CPAH and OPAH)



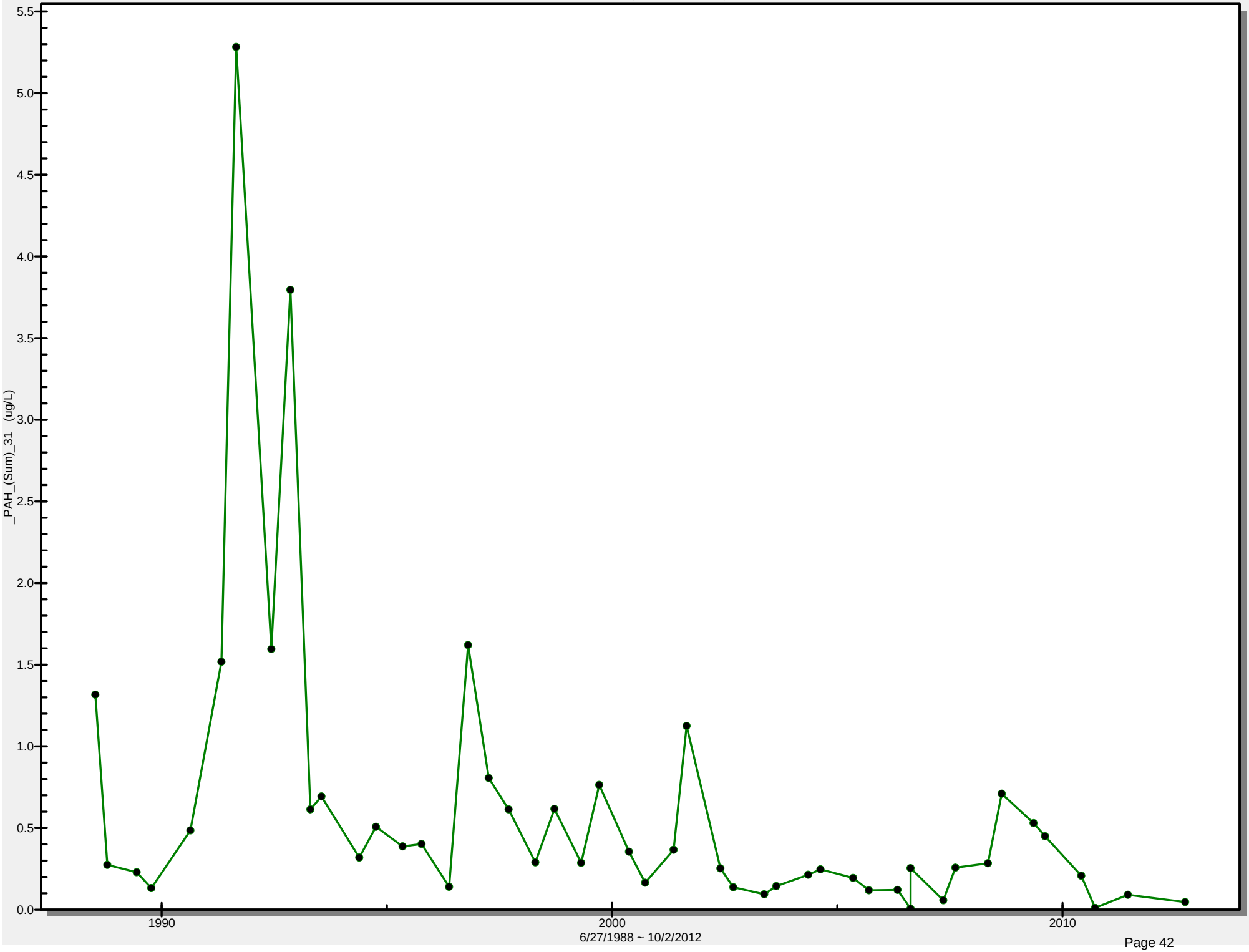
# Well W411

Total PAH Sum (CPAH and OPAH)



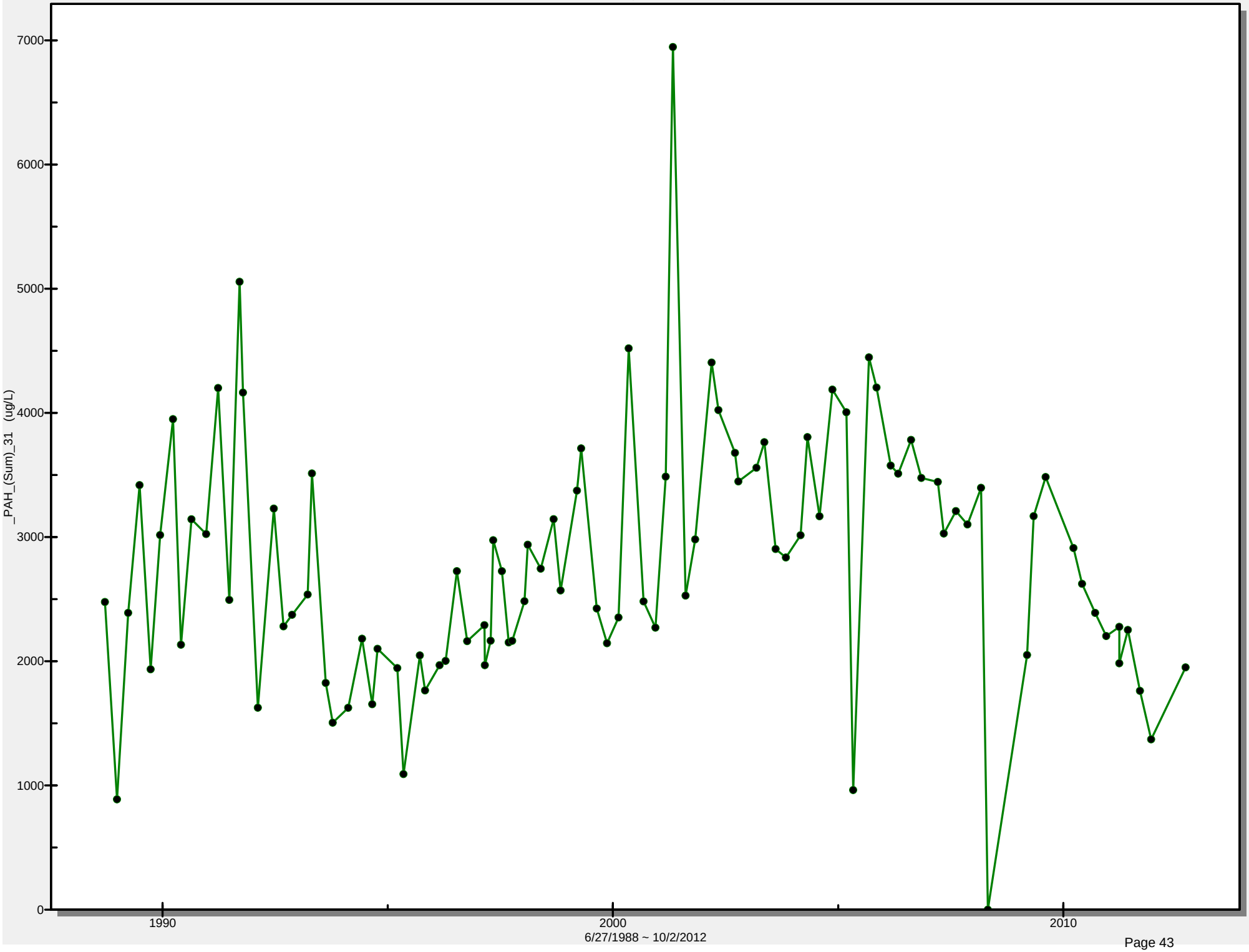
# Well W412

Total PAH Sum (CPAH and OPAH)



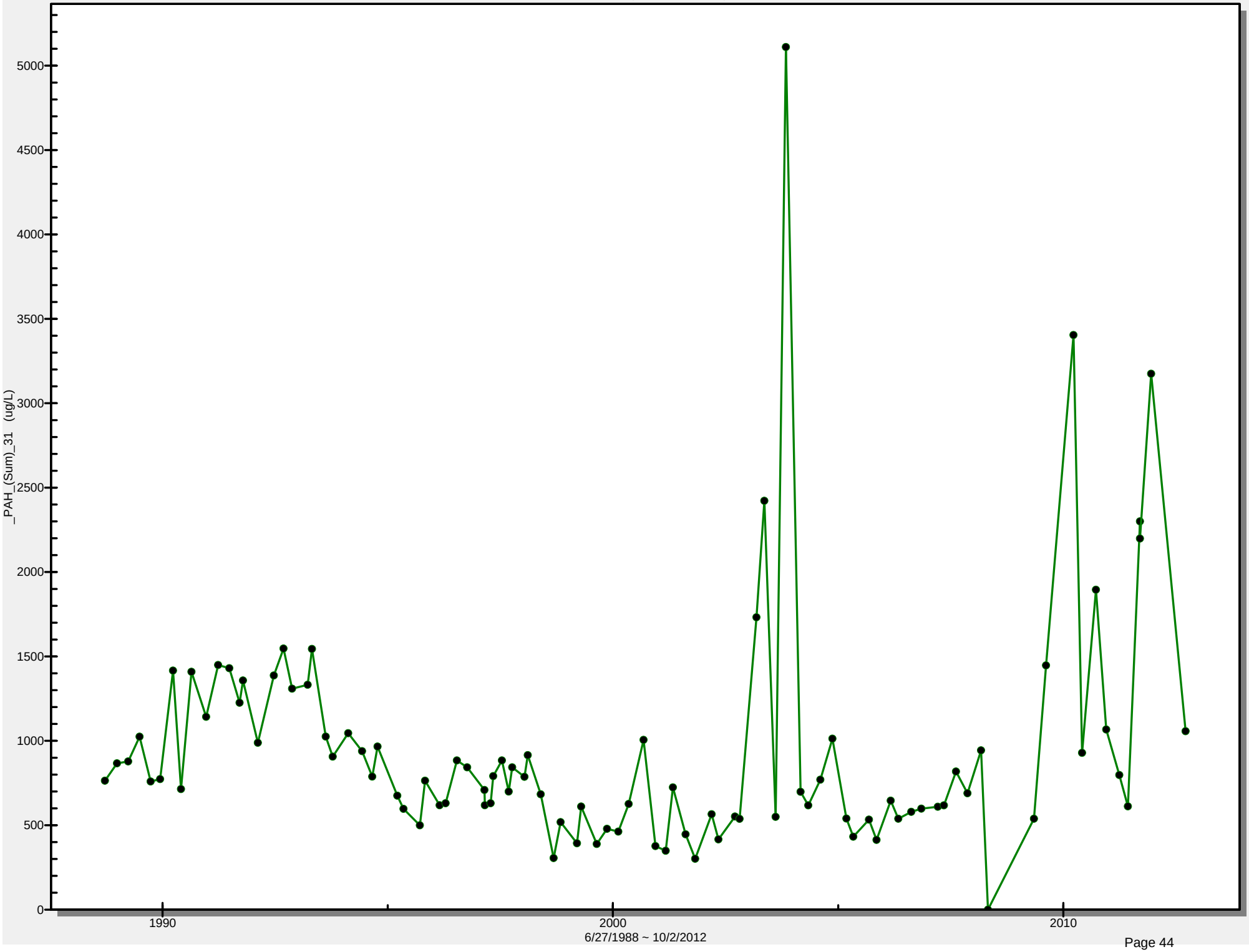
# Well W420

Total PAH Sum (CPAH and OPAH)



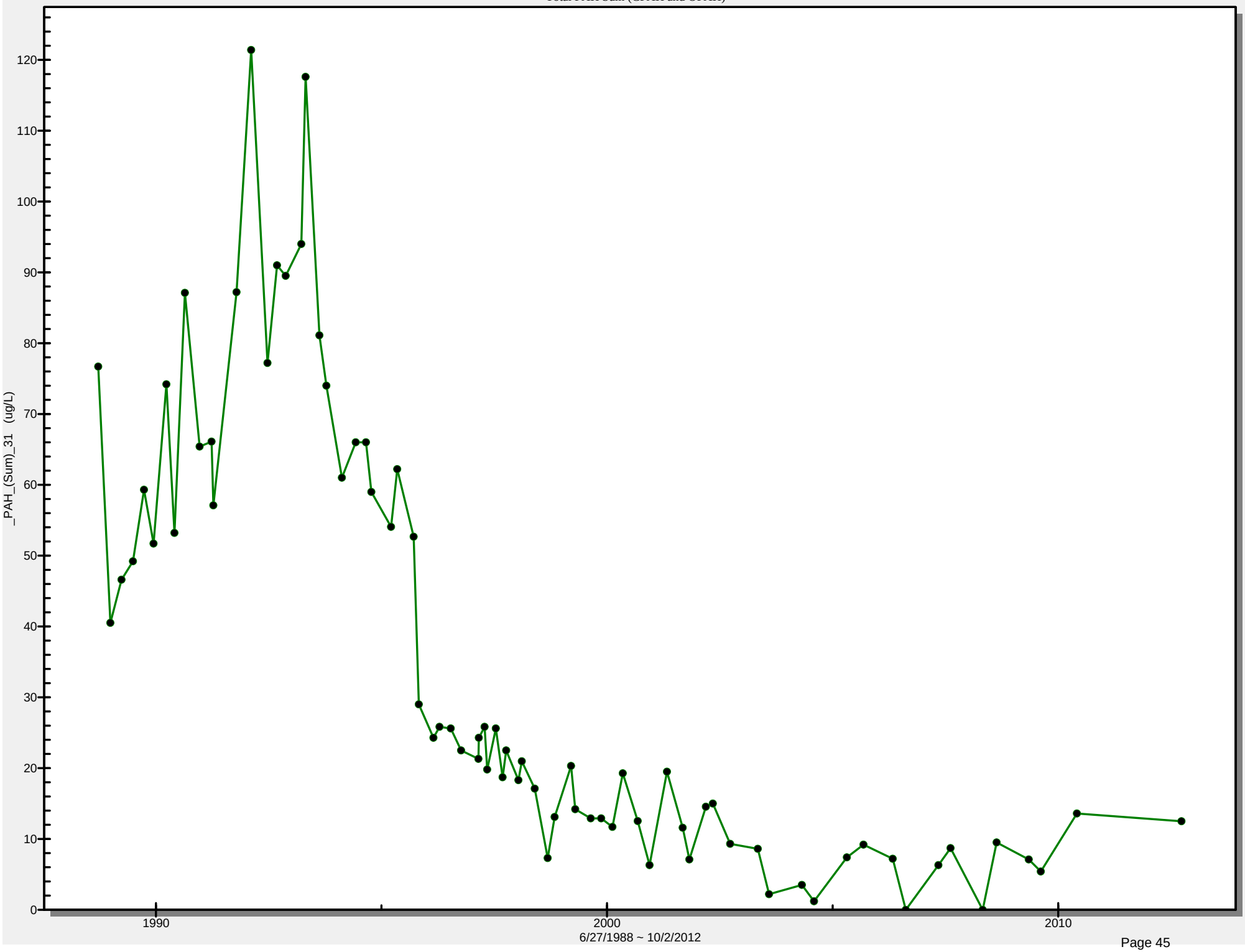
# Well W421

Total PAH Sum (CPAH and OPAH)



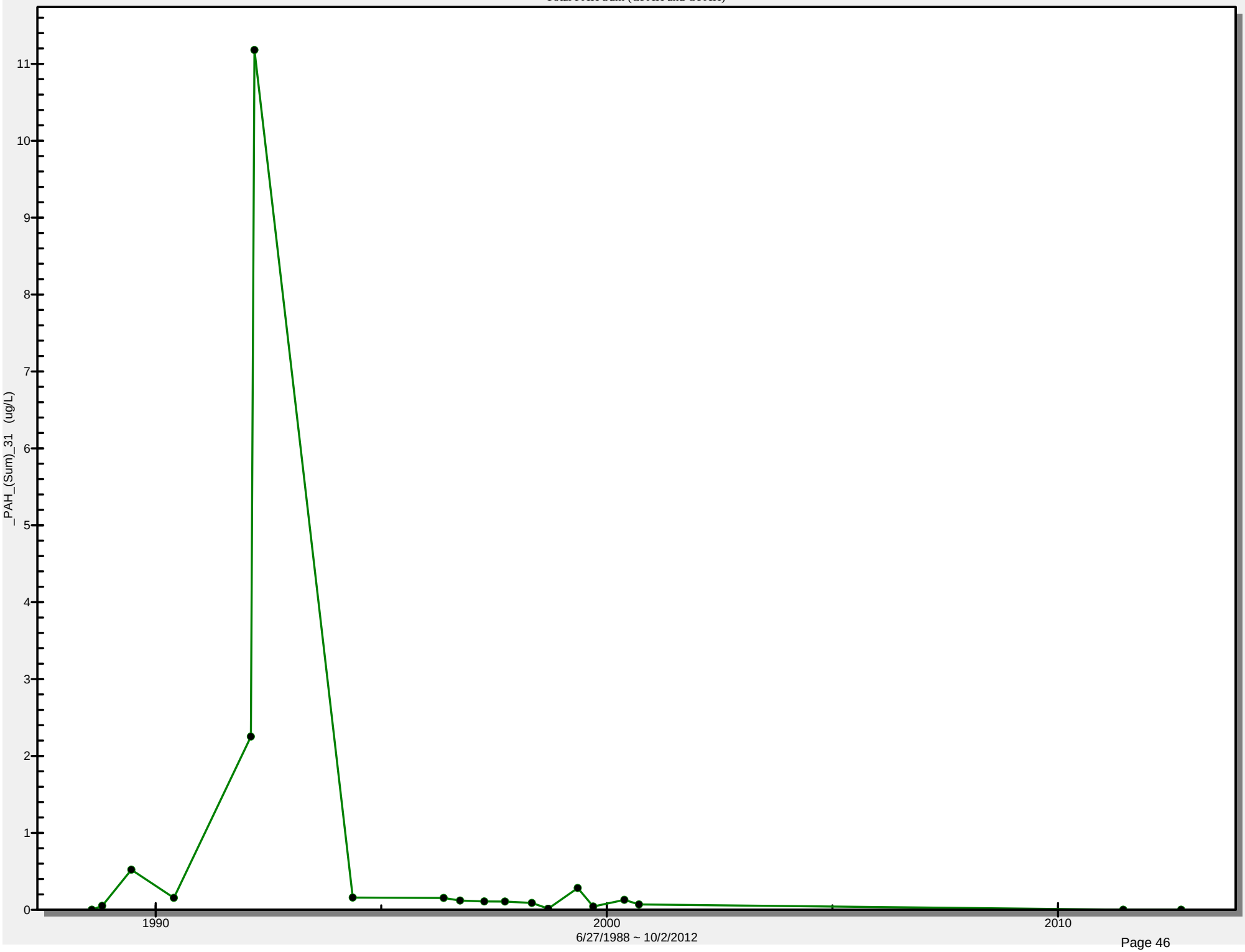
# Well W422

Total PAH Sum (CPAH and OPAH)



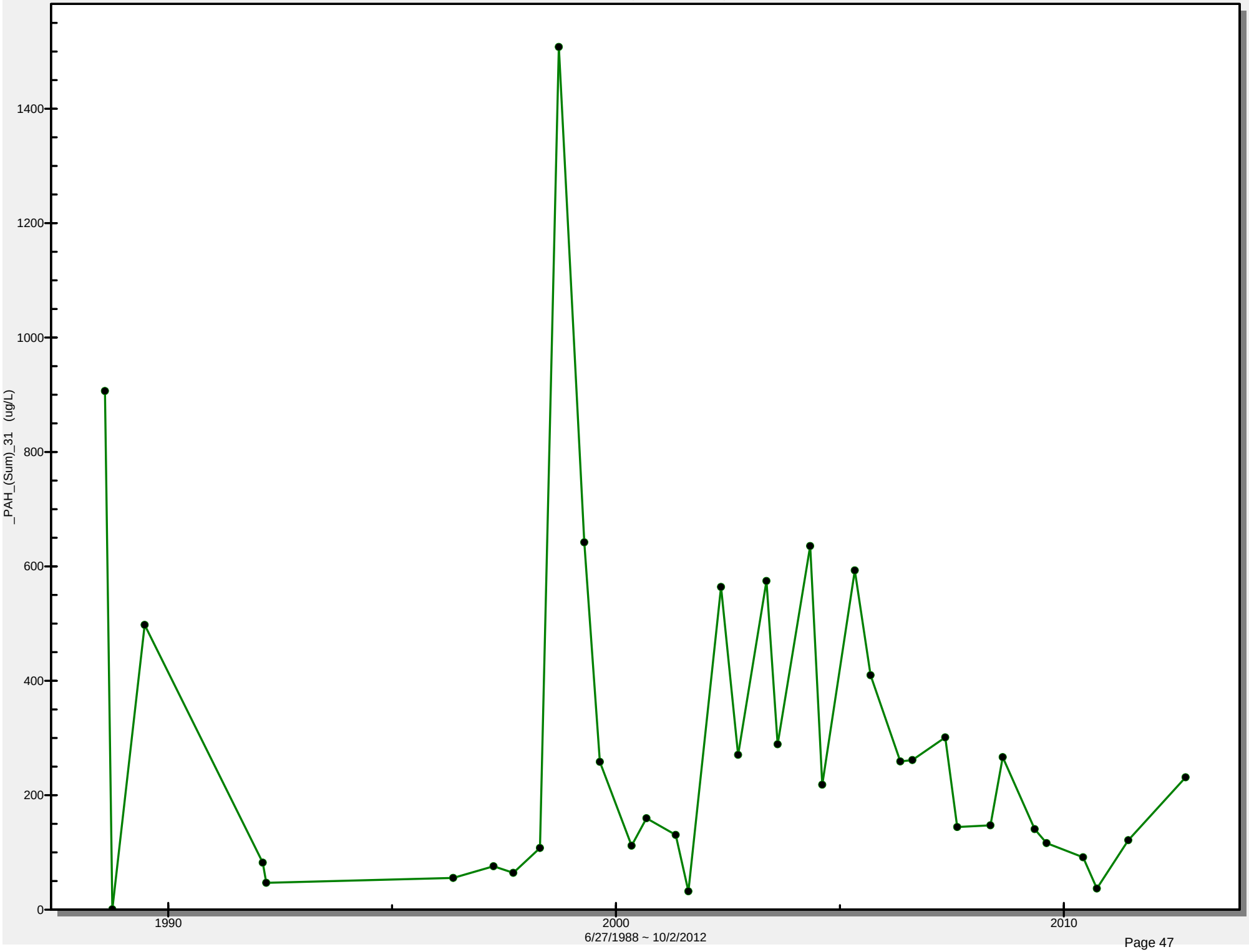
# Well W424

Total PAH Sum (CPAH and OPAH)



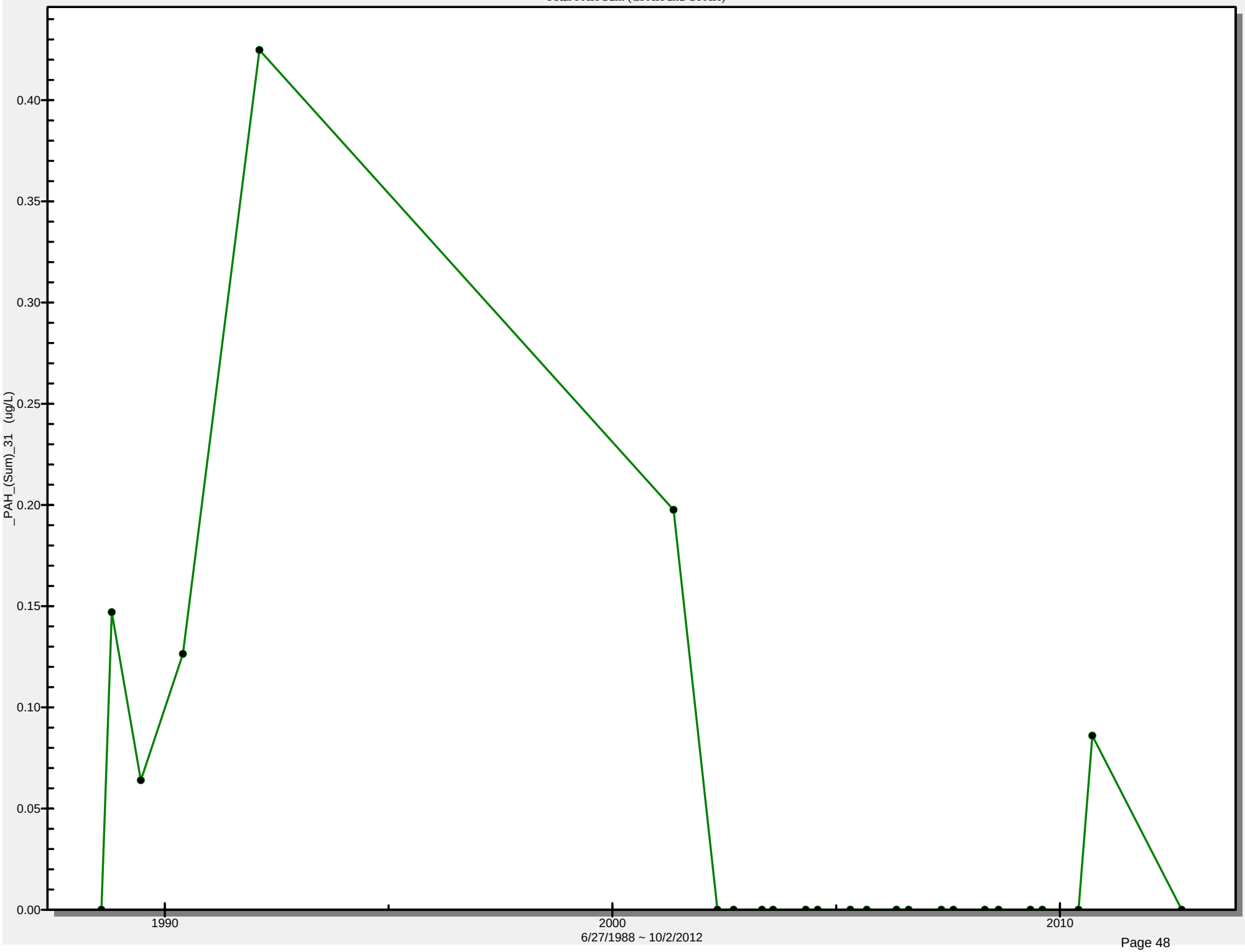
# Well W426

Total PAH Sum (CPAH and OPAH)



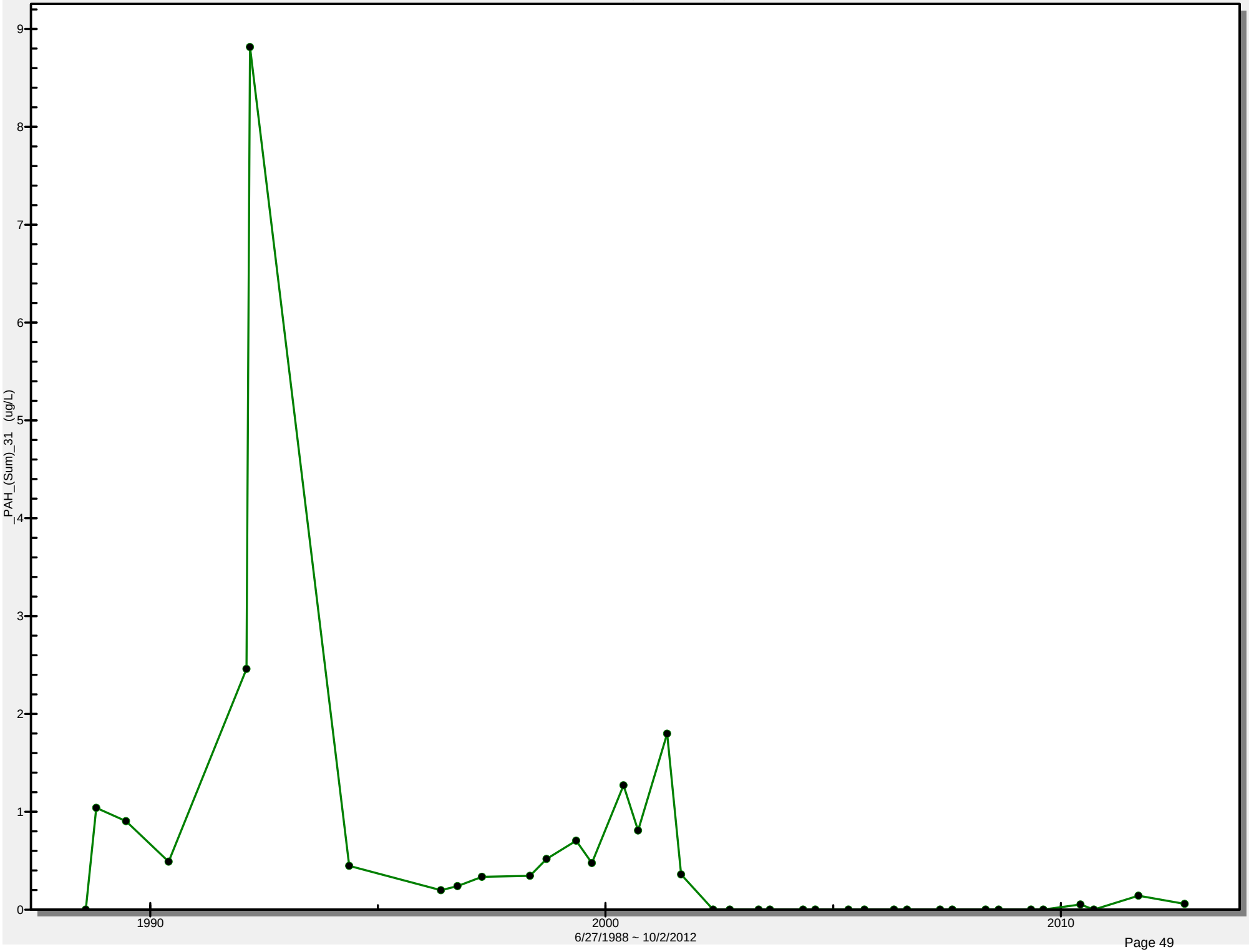
# Well W427

Total PAH Sum (CPAH and OPAH)



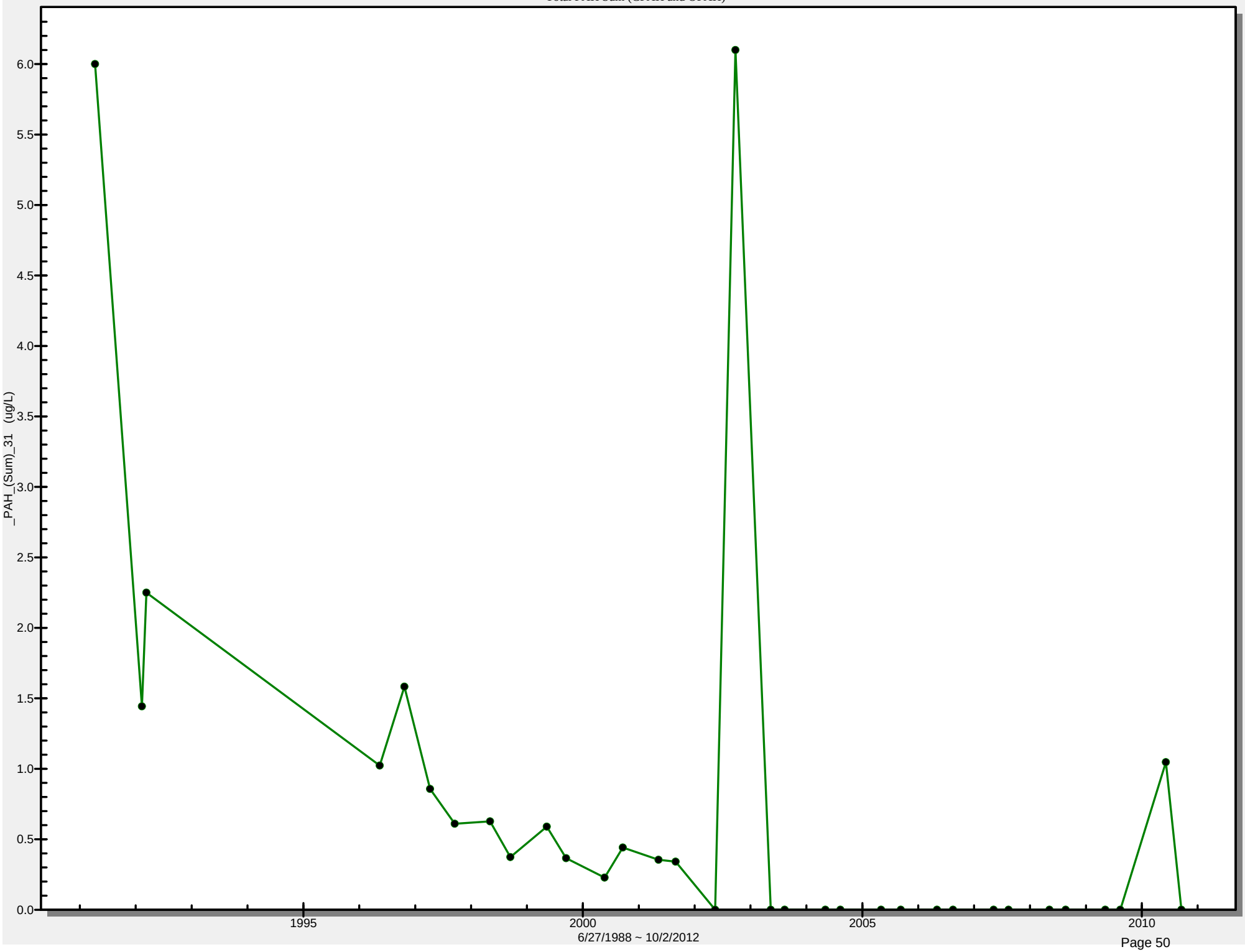
# Well W428

Total PAH Sum (CPAH and OPAH)



# Well W431

Total PAH Sum (CPAH and OPAH)

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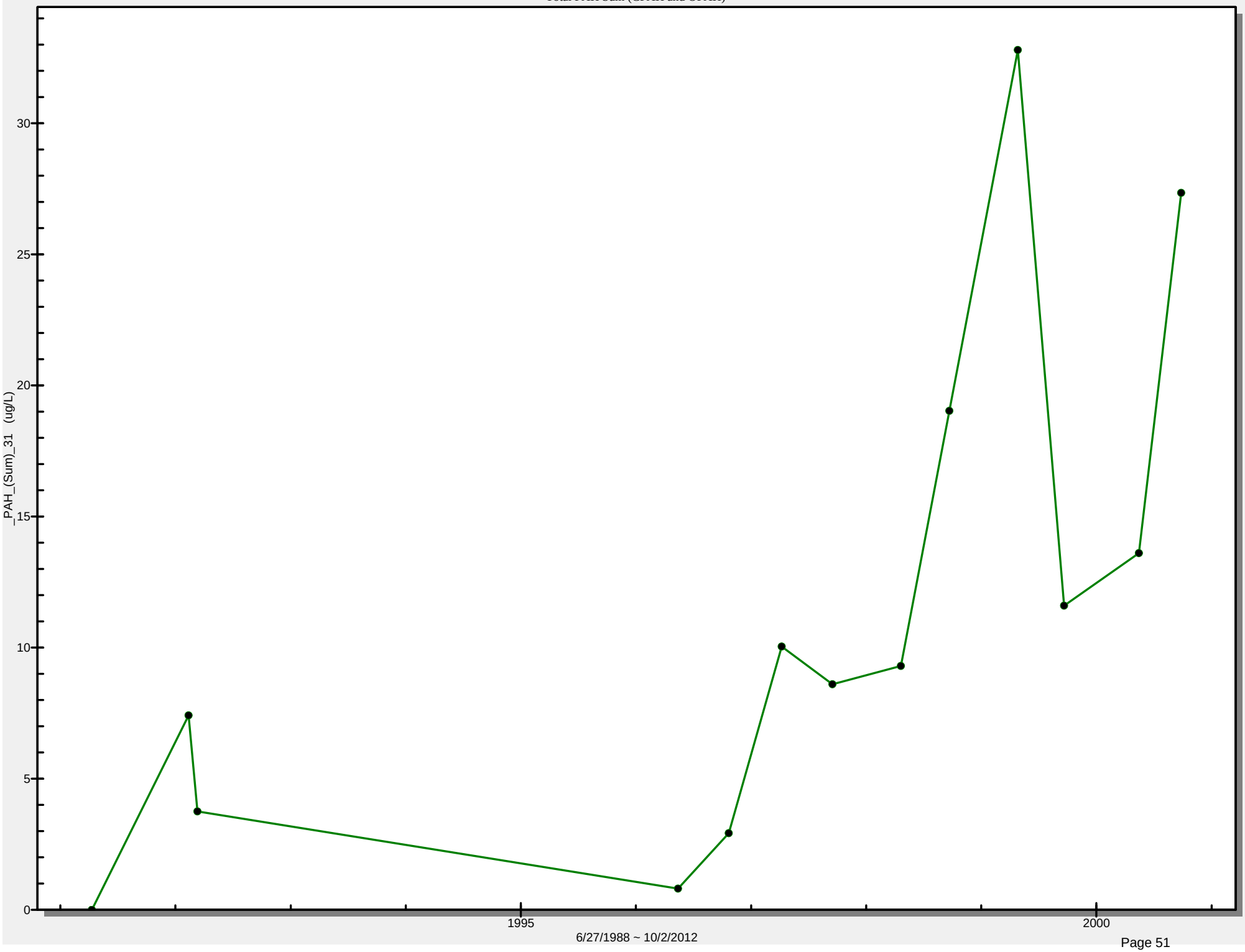
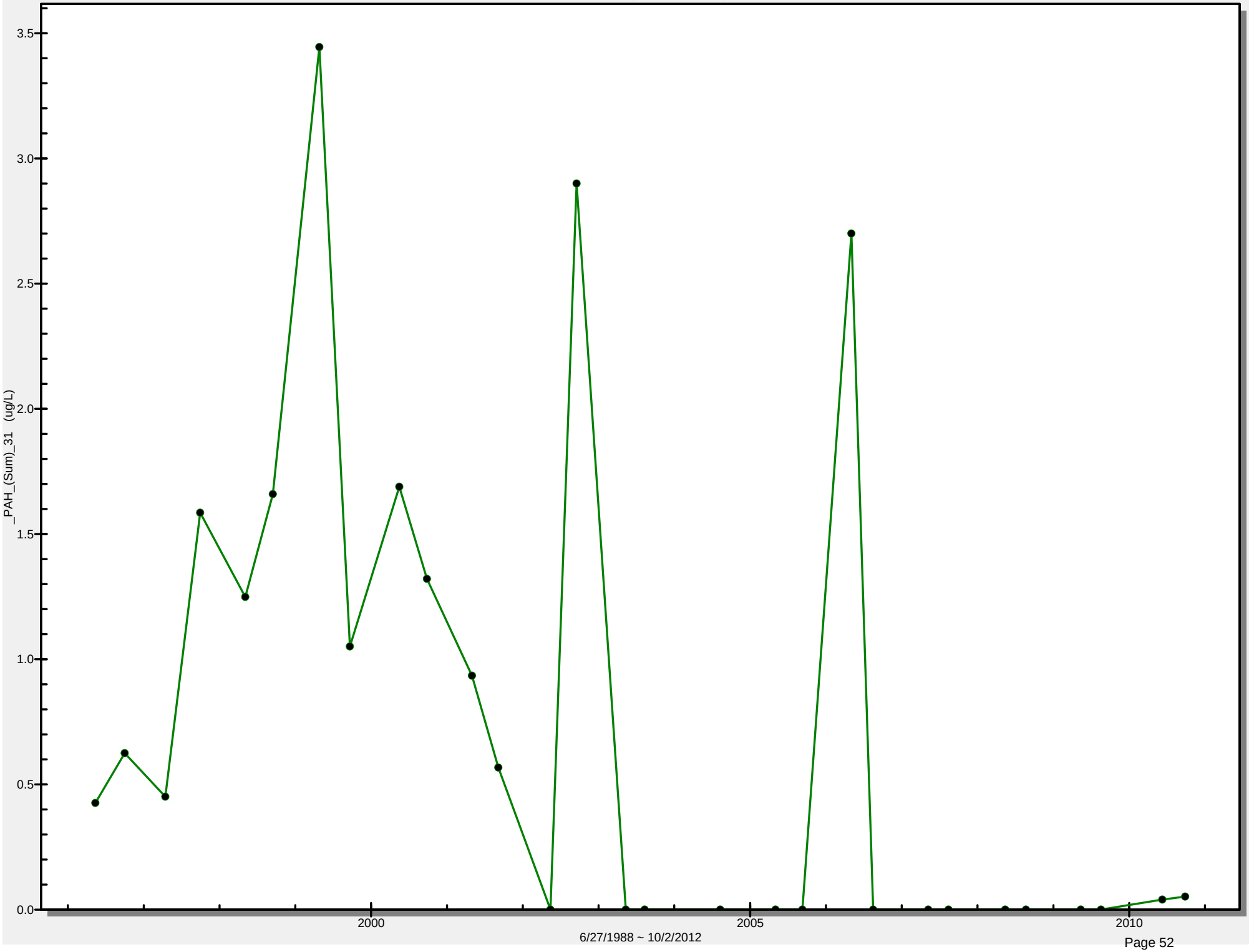
# Well W432

Total PAH Sum (CPAH and OPAH)



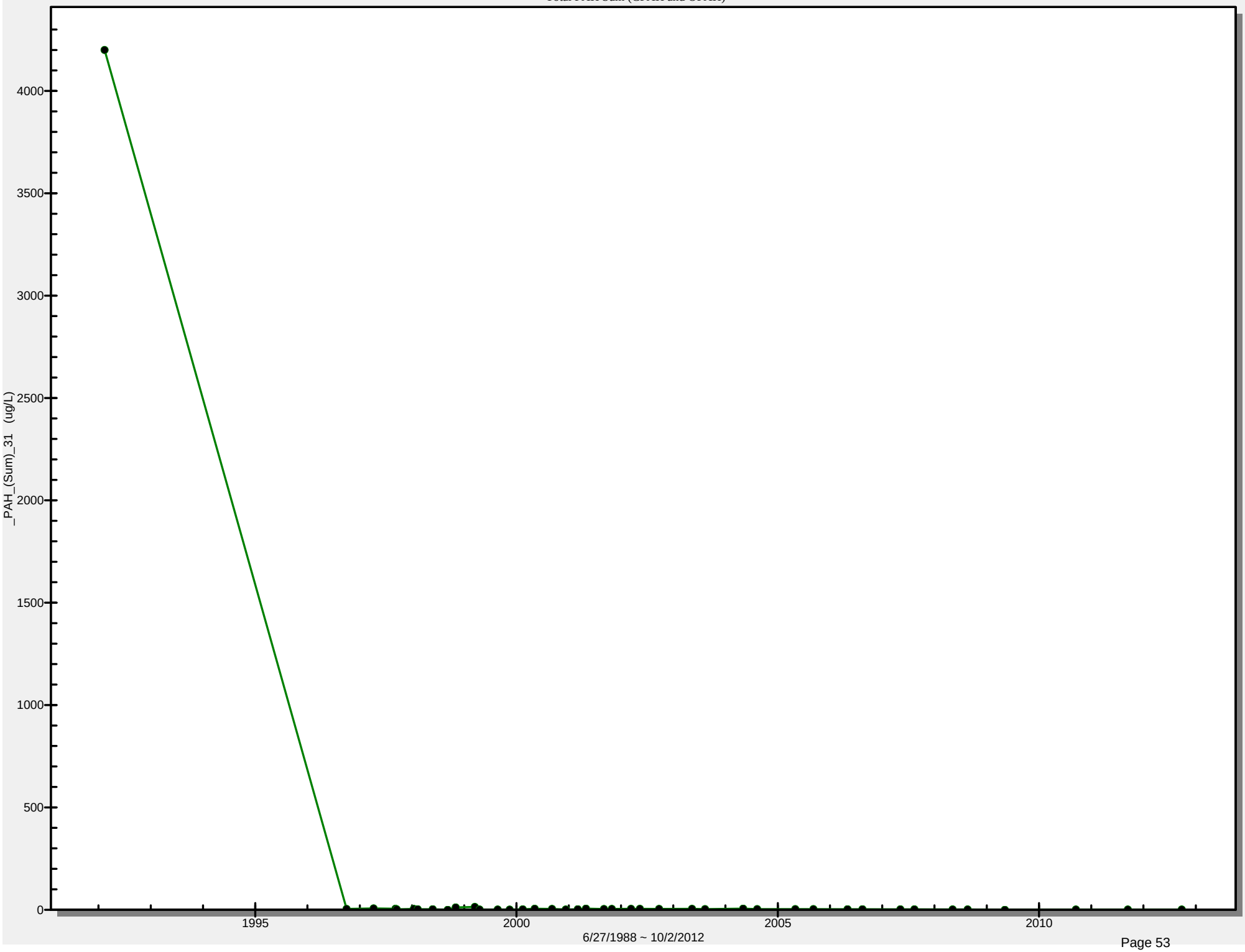
# Well W433

Total PAH Sum (CPAH and OPAH)



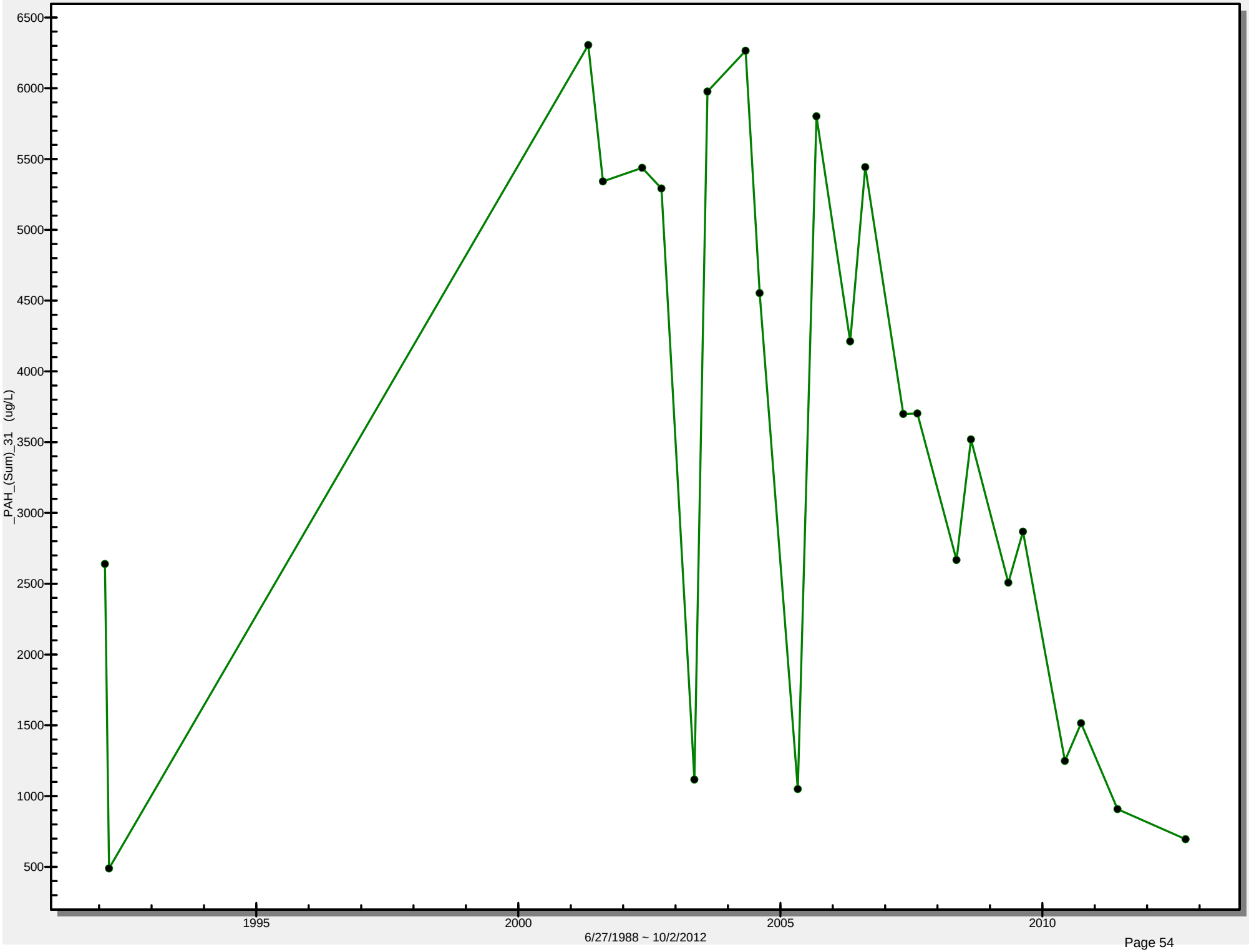
# Well W434

Total PAH Sum (CPAH and OPAH)



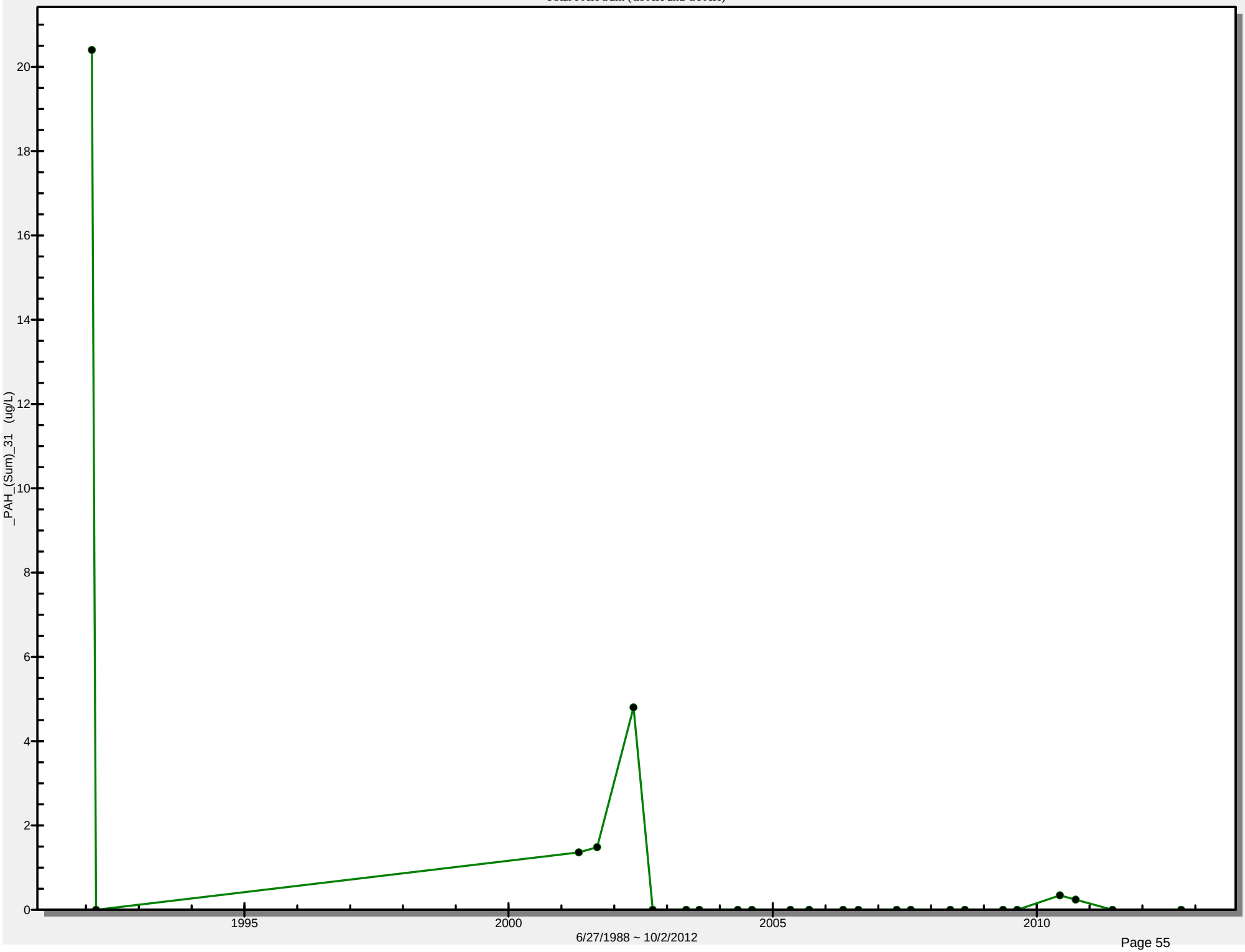
# Well W437

Total PAH Sum (CPAH and OPAH)



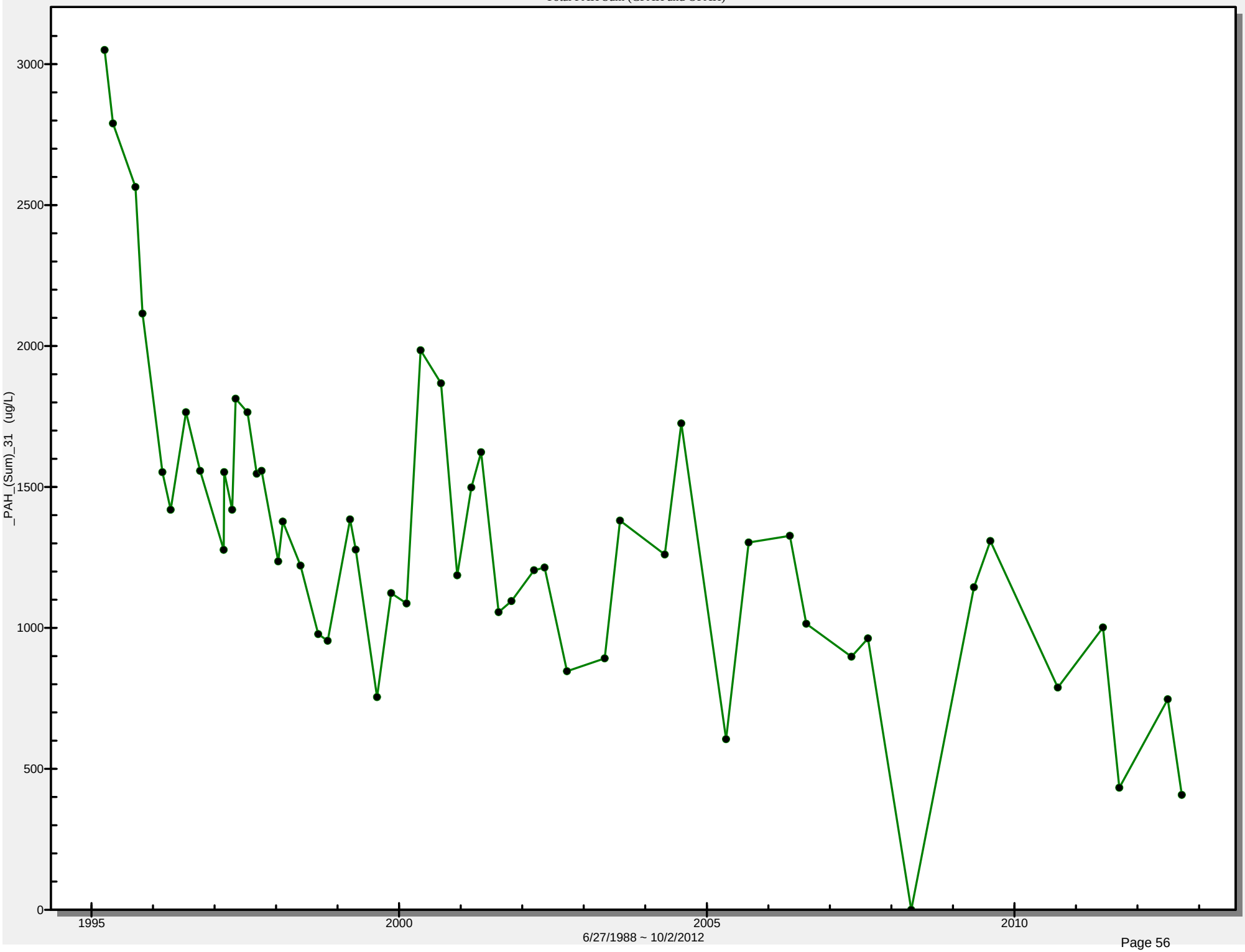
# Well W438

Total PAH Sum (CPAH and OPAH)



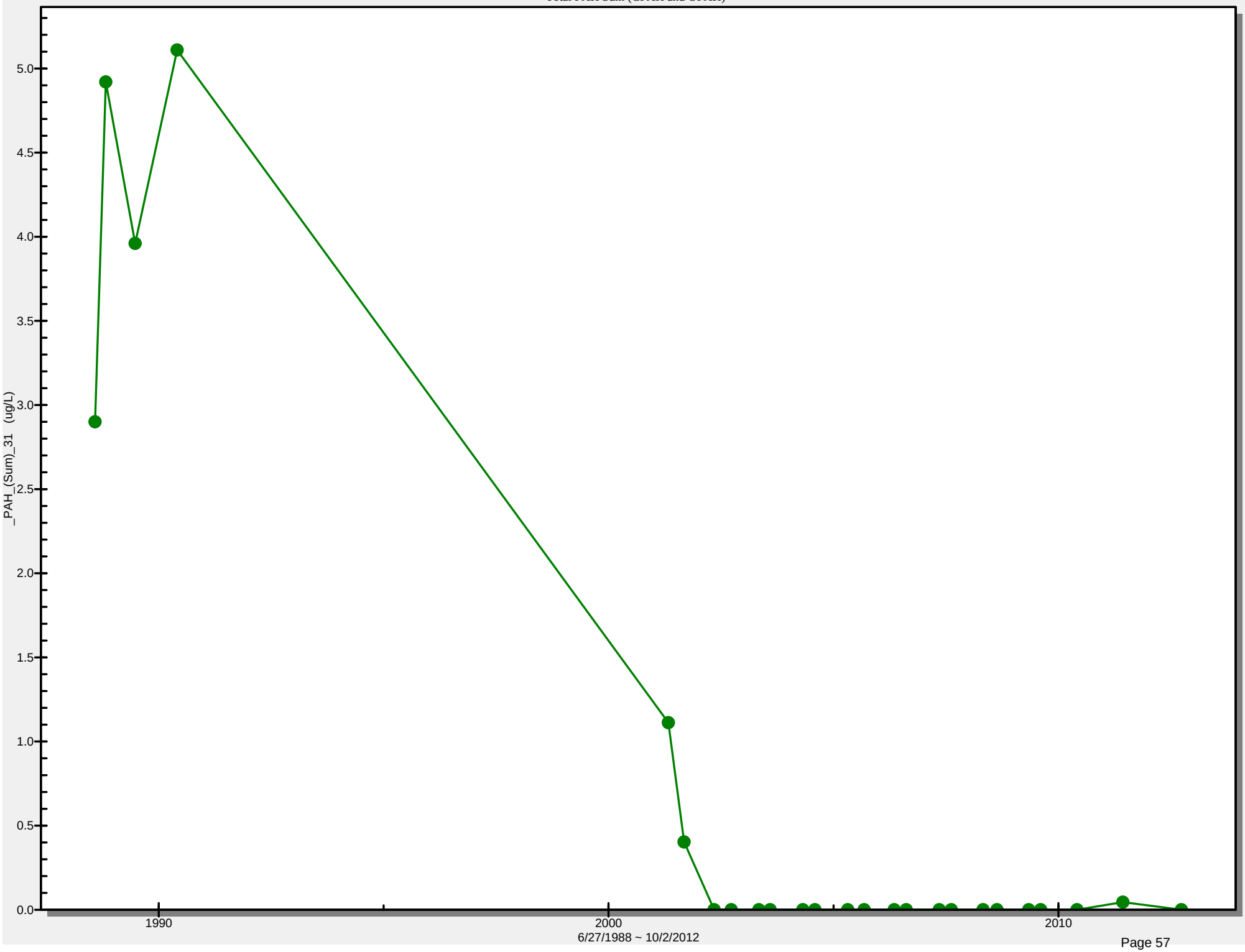
# Well W439

Total PAH Sum (CPAH and OPAH)



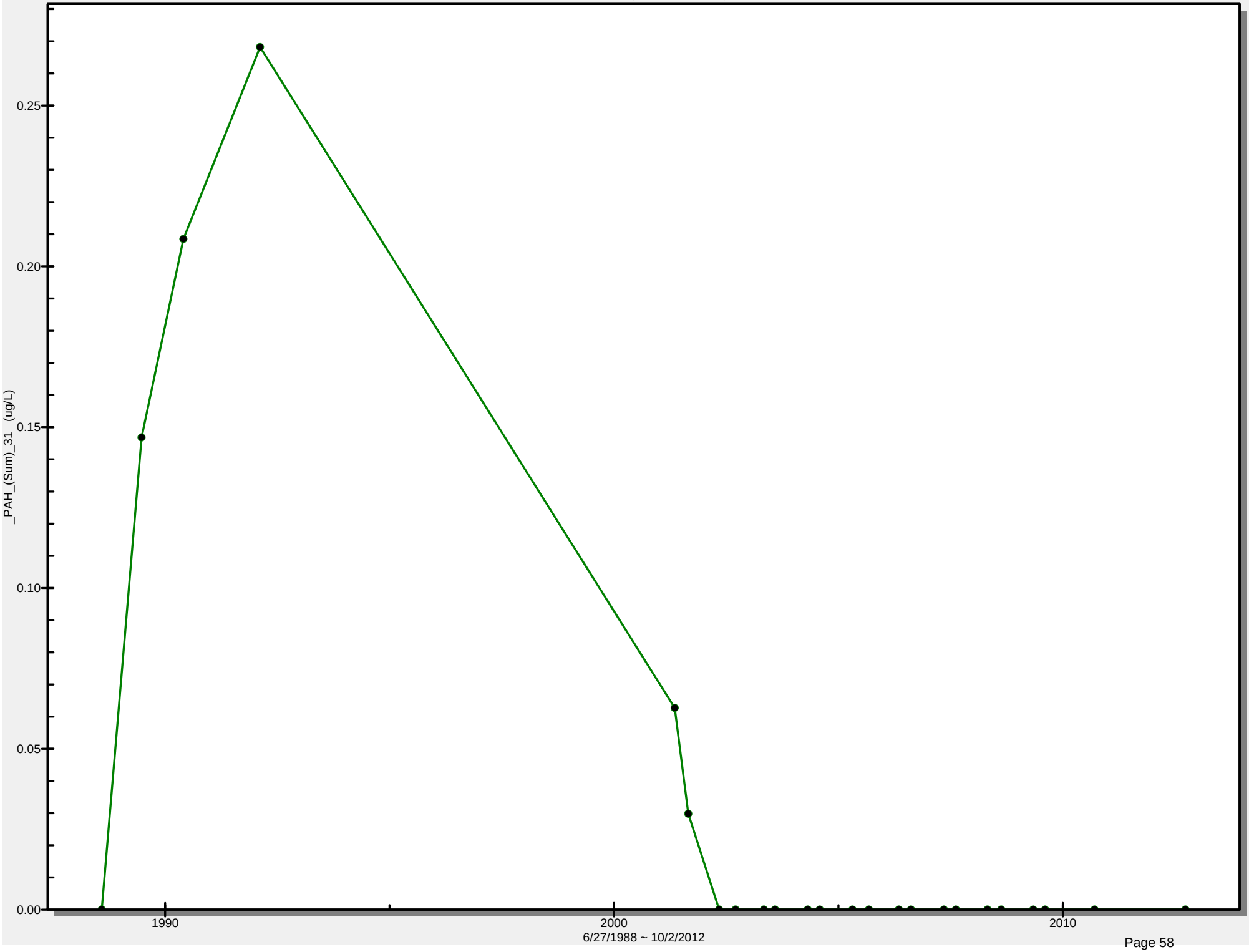
# Well P109

Total PAH Sum (CPAH and OPAH)



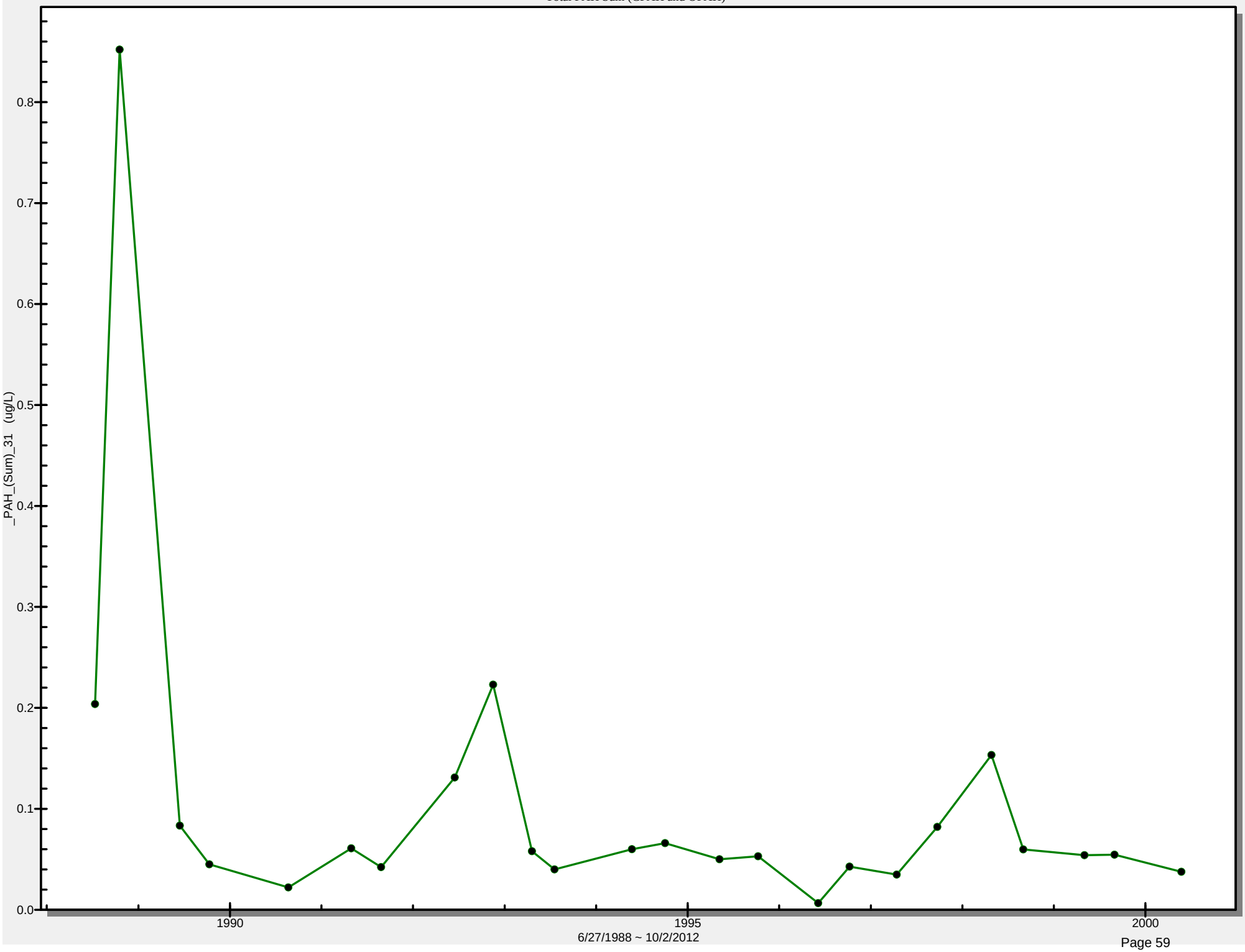
# Well P112

Total PAH Sum (CPAH and OPAH)



# Well P116

Total PAH Sum (CPAH and OPAH)

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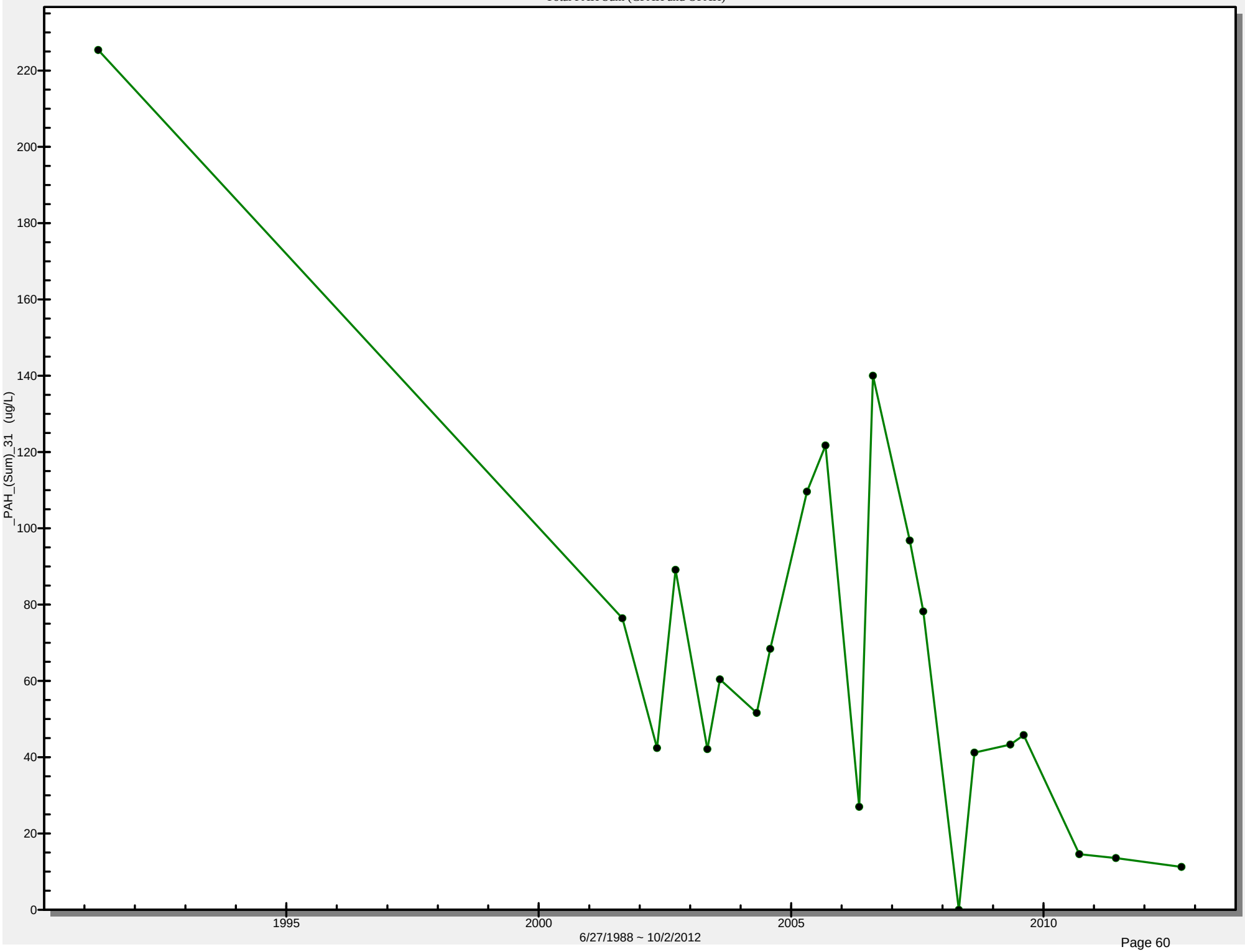
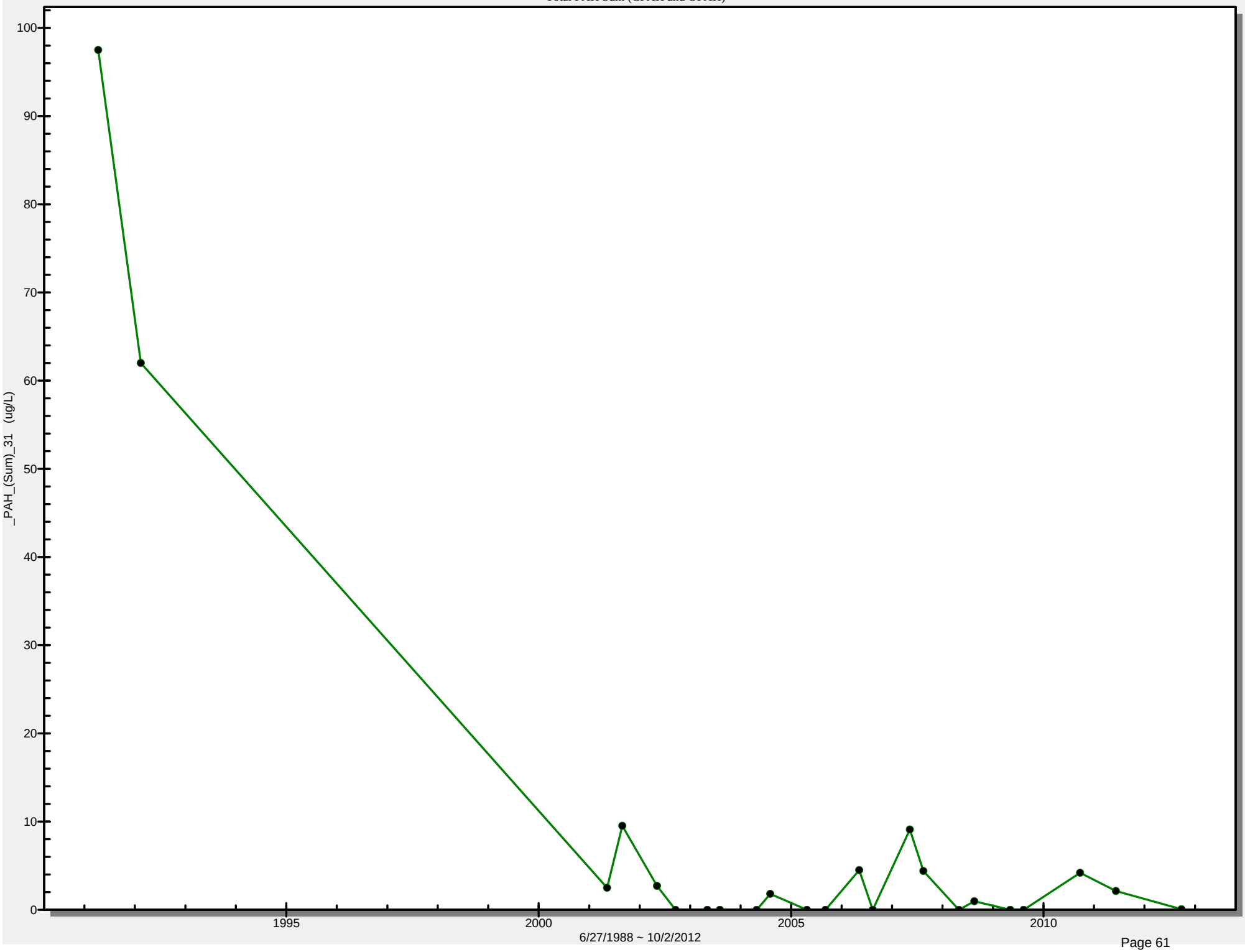
# Well P307

Total PAH Sum (CPAH and OPAH)



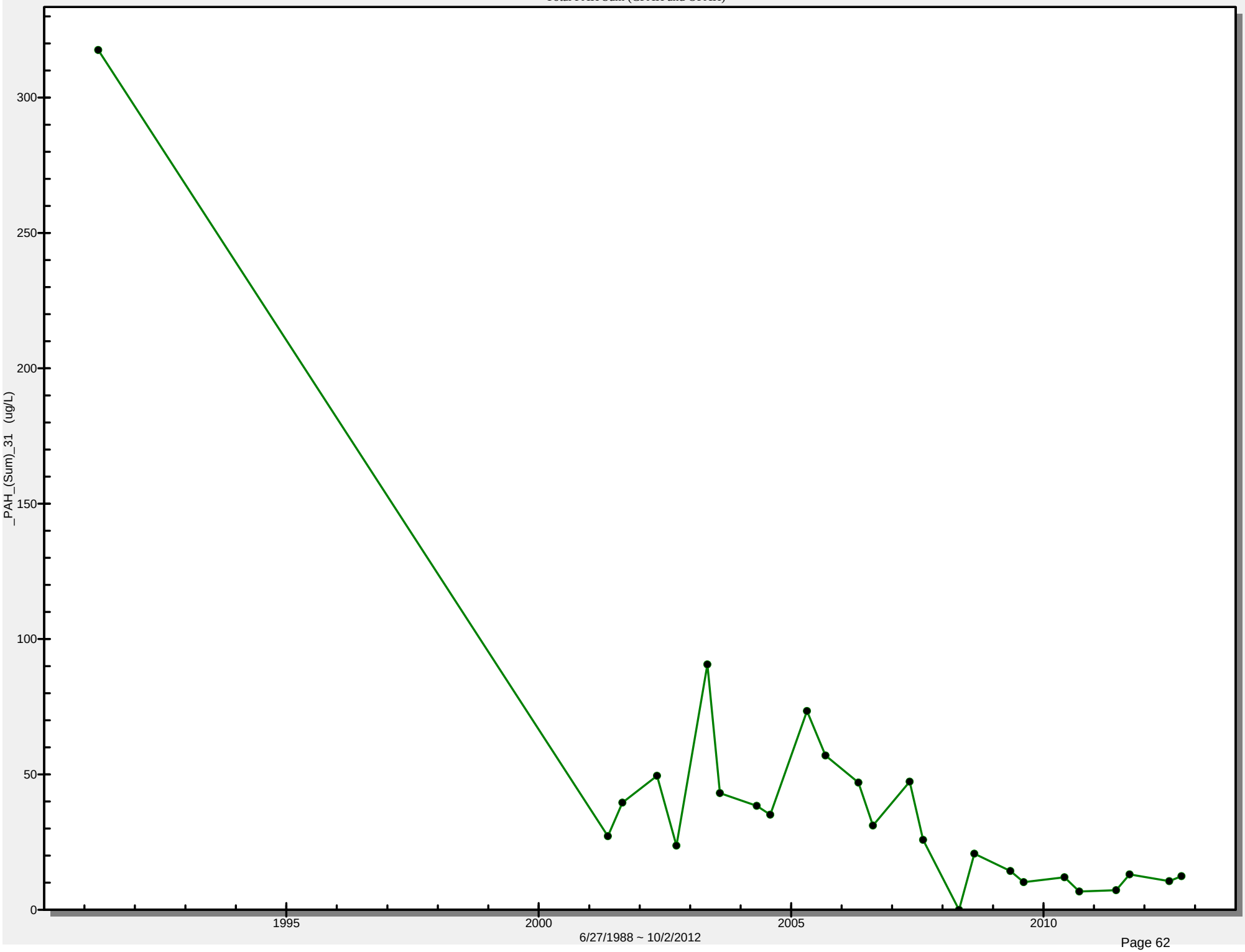
# Well P308

Total PAH Sum (CPAH and OPAH)



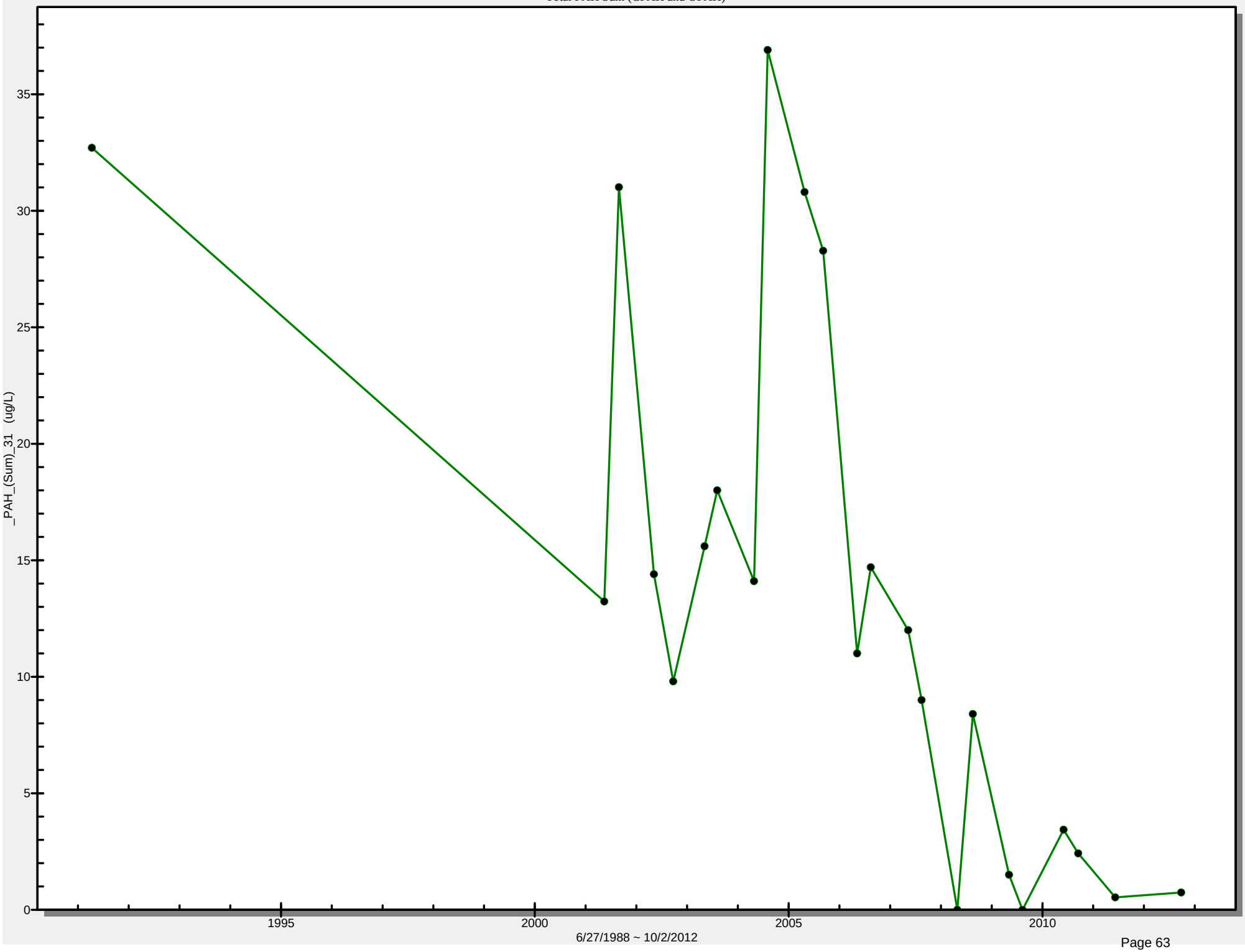
# Well P309

Total PAH Sum (CPAH and OPAH)



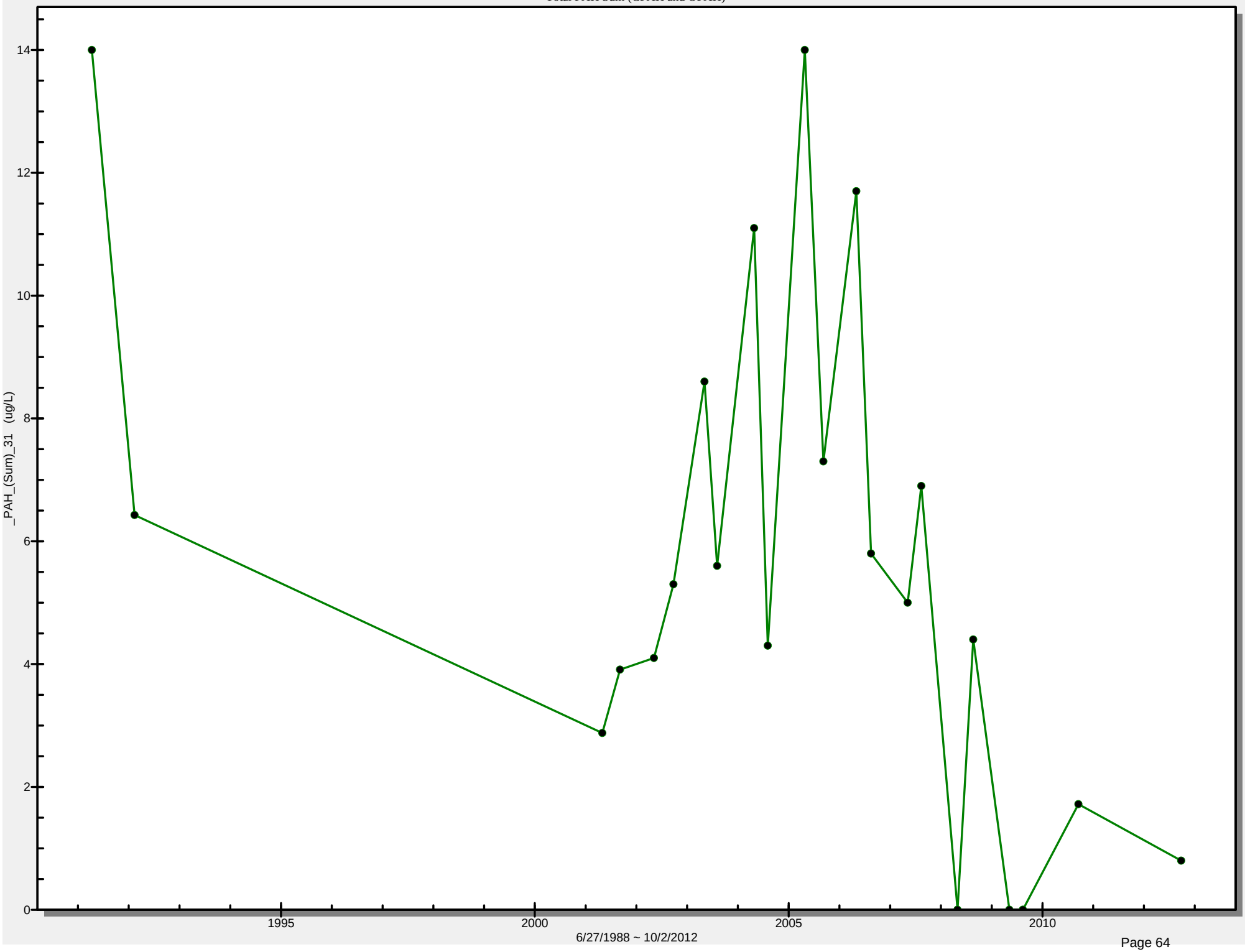
# Well P310

Total PAH Sum (CPAH and OPAH)



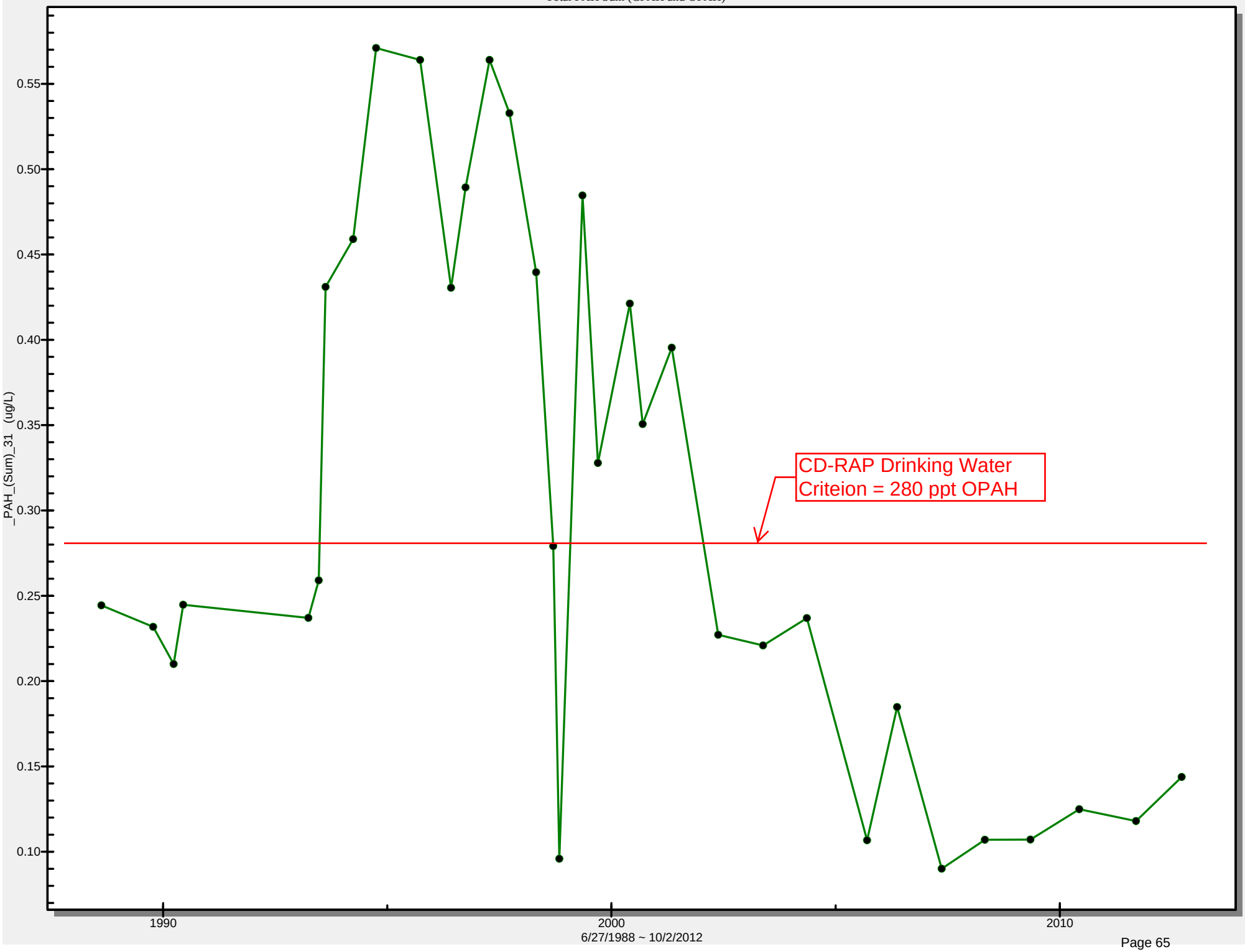
# Well P312

Total PAH Sum (CPAH and OPAH)



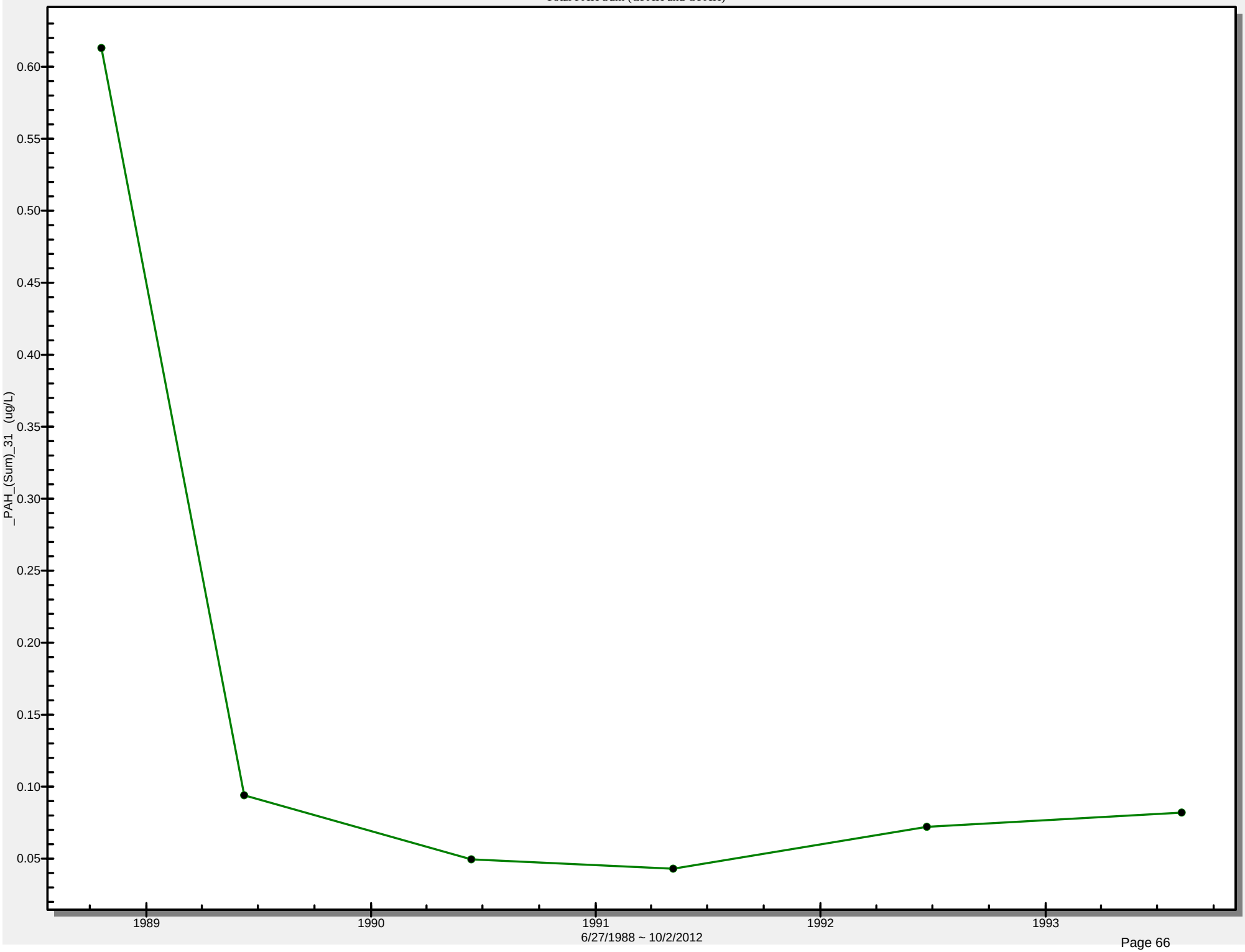
# Well SLP4

Total PAH Sum (CPAH and OPAH)



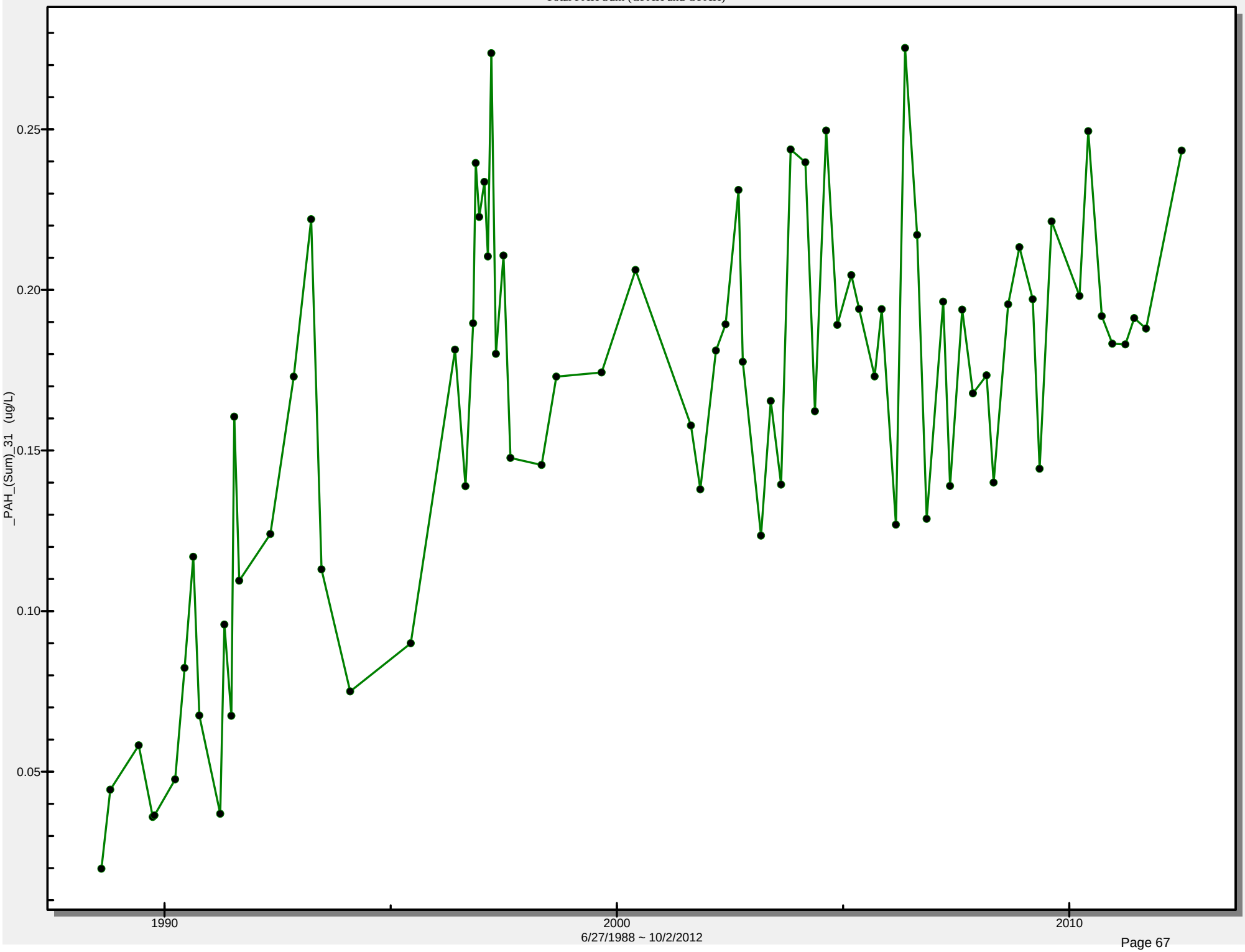
# Well SLP5

Total PAH Sum (CPAH and OPAH)



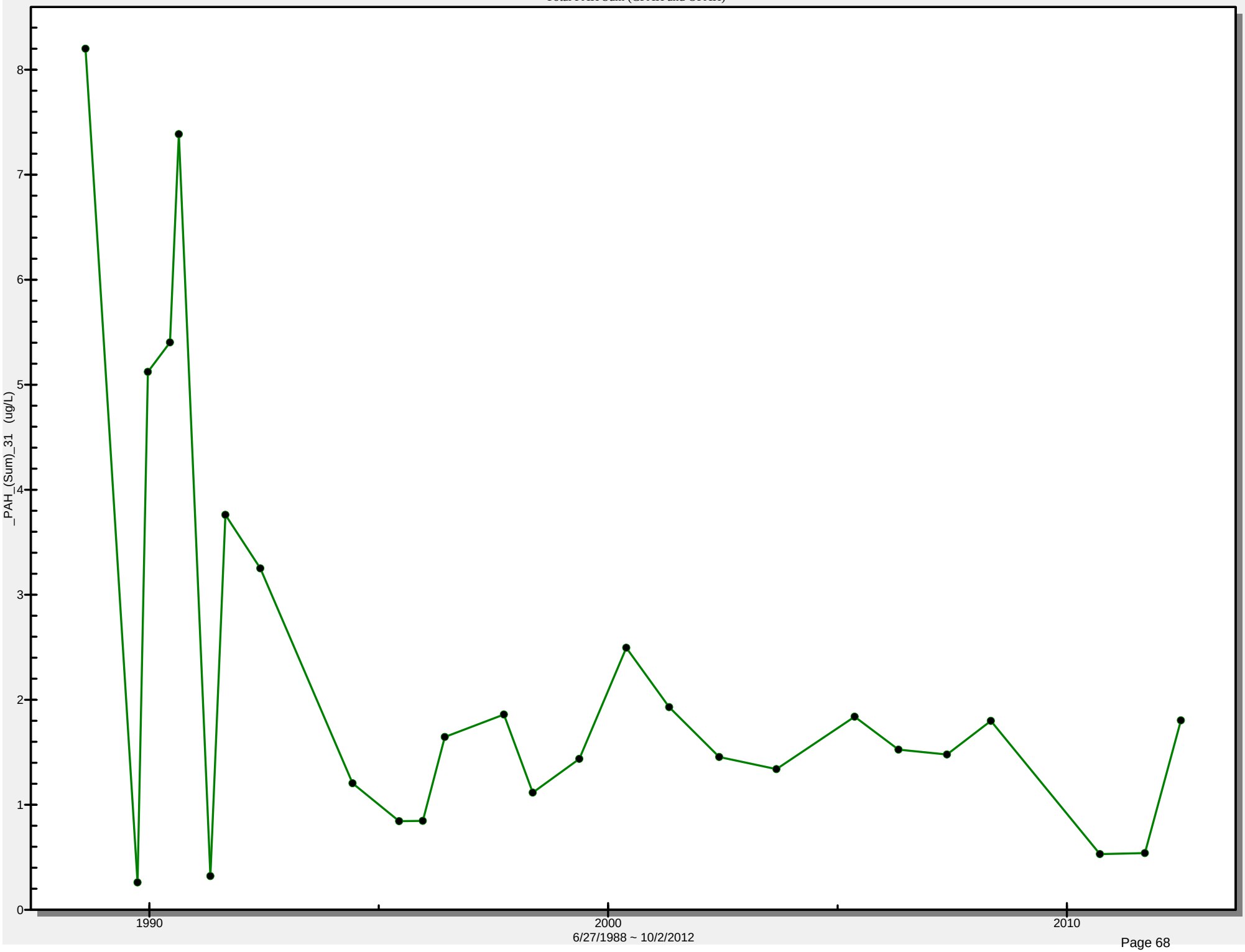
# Well SLP6

Total PAH Sum (CPAH and OPAH)



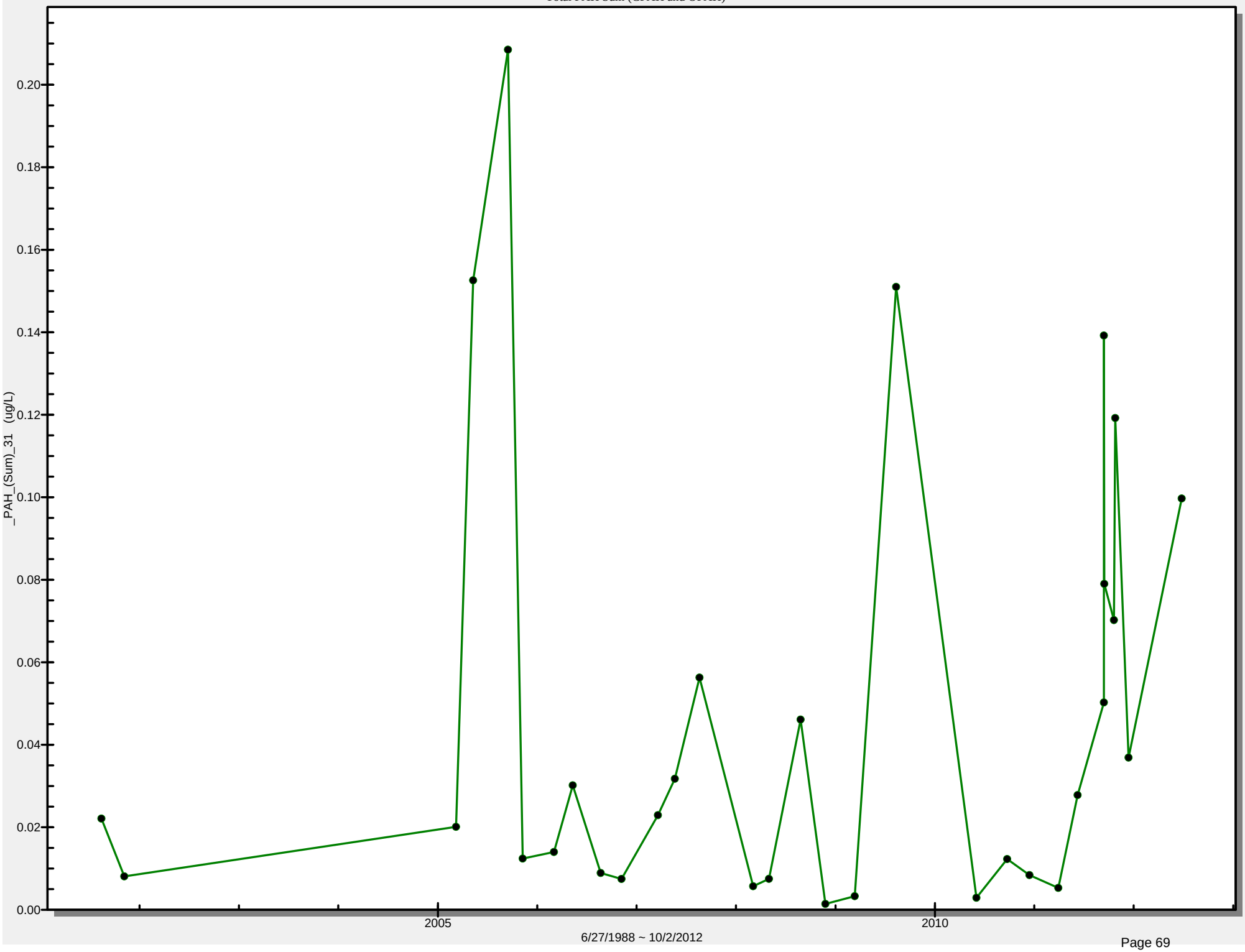
# Well SLP10

Total PAH Sum (CPAH and OPAH)



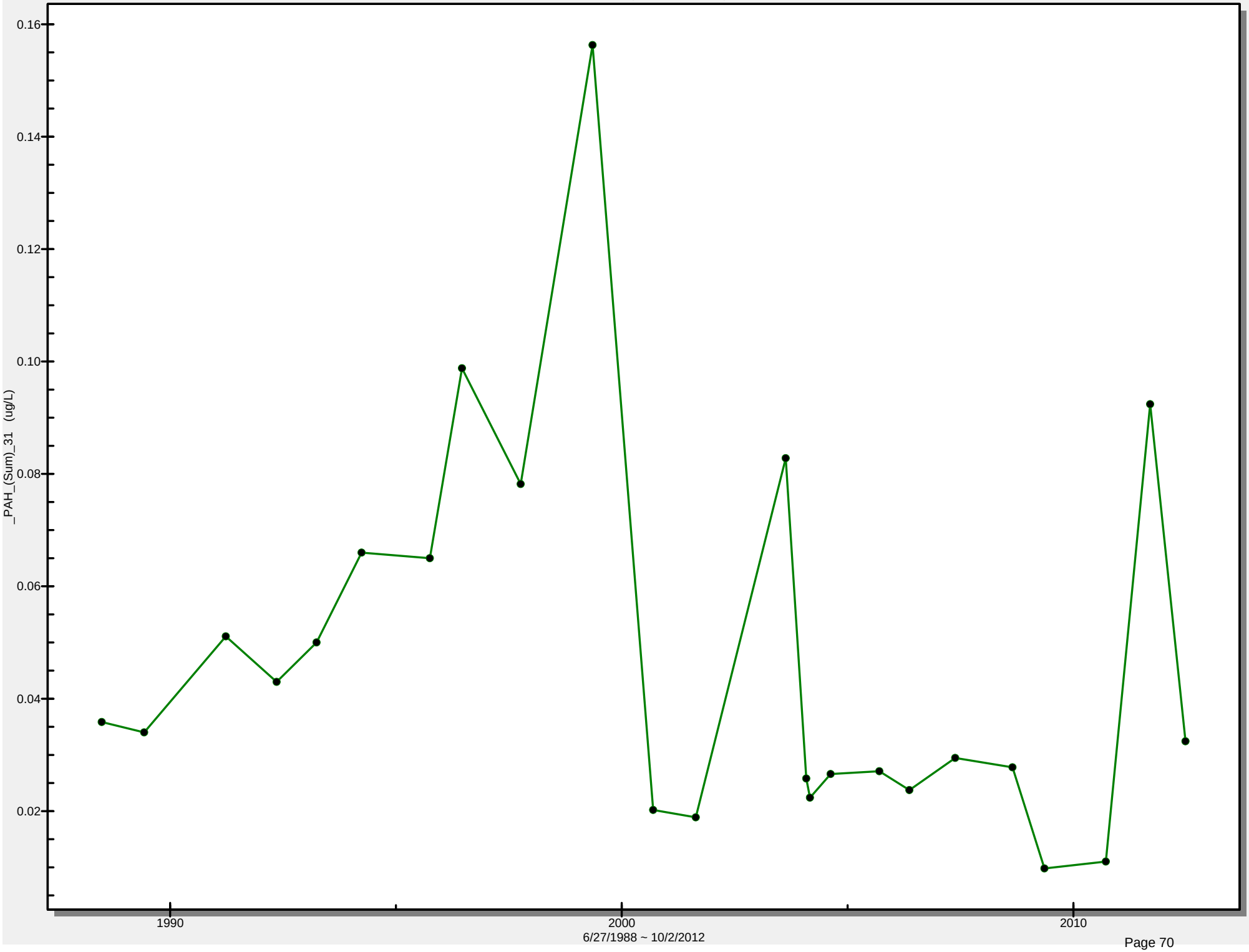
# Well SLP10-T

Total PAH Sum (CPAH and OPAH)



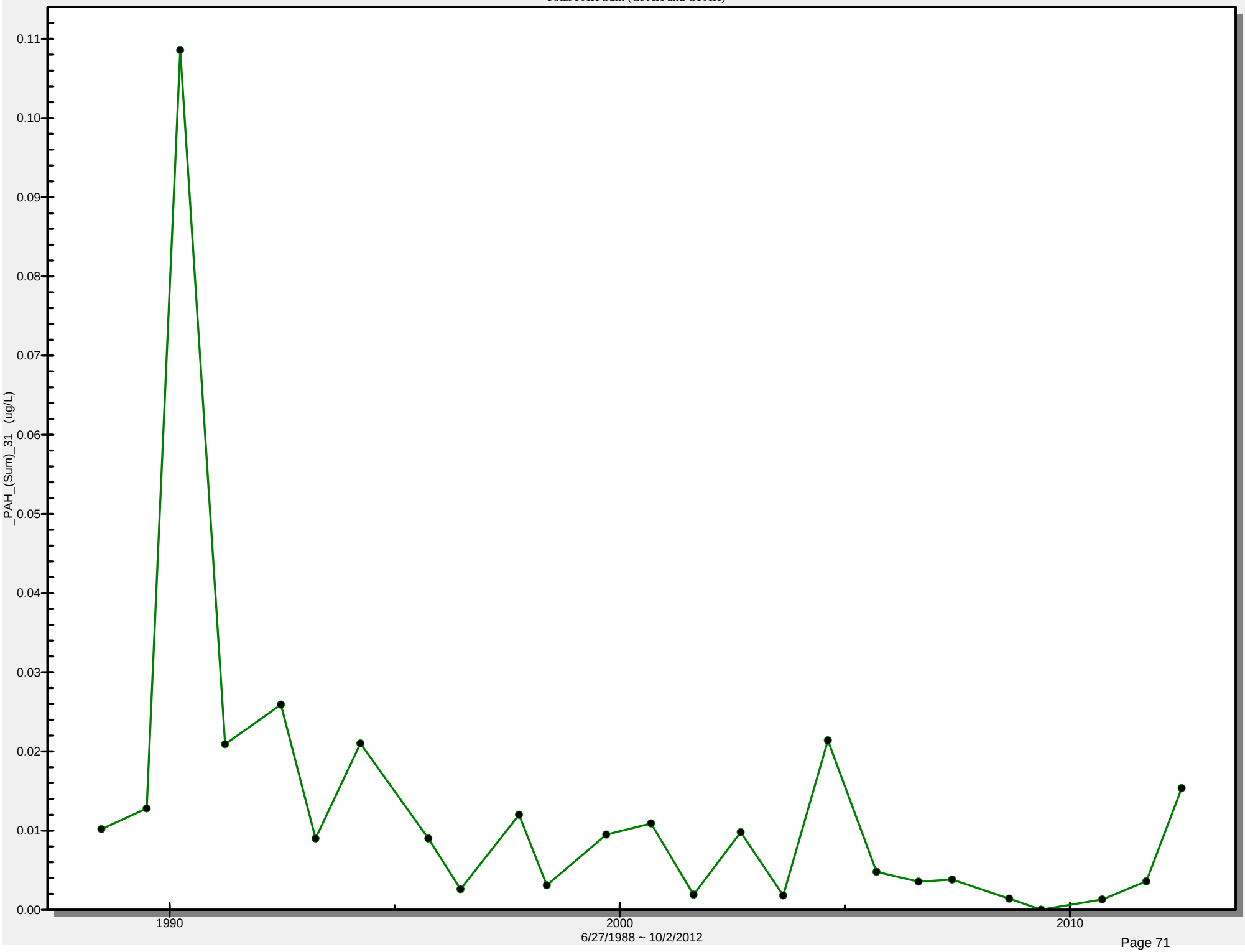
# Well SLP11

Total PAH Sum (CPAH and OPAH)



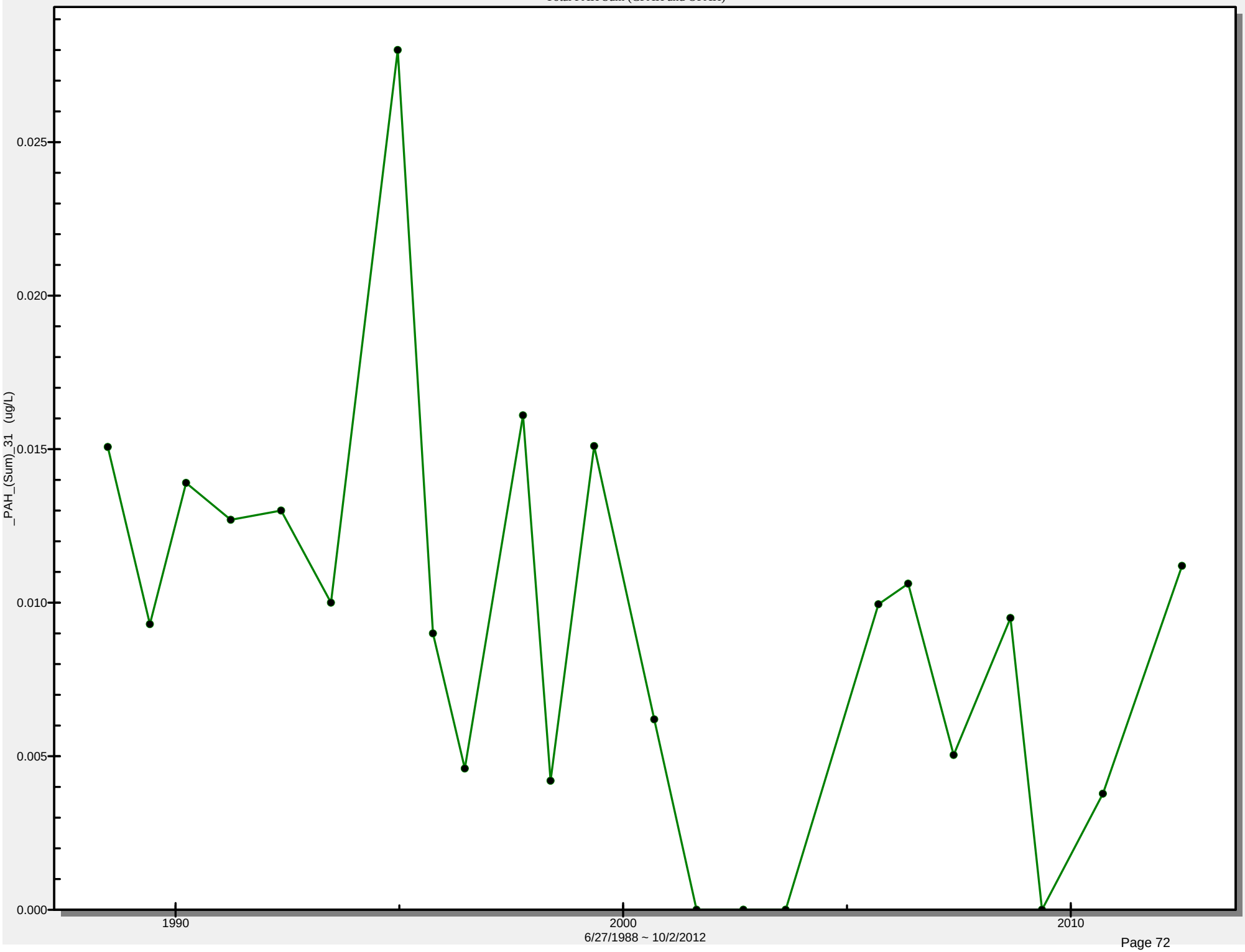
# Well SLP12

Total PAH Sum (CPAH and OPAH)



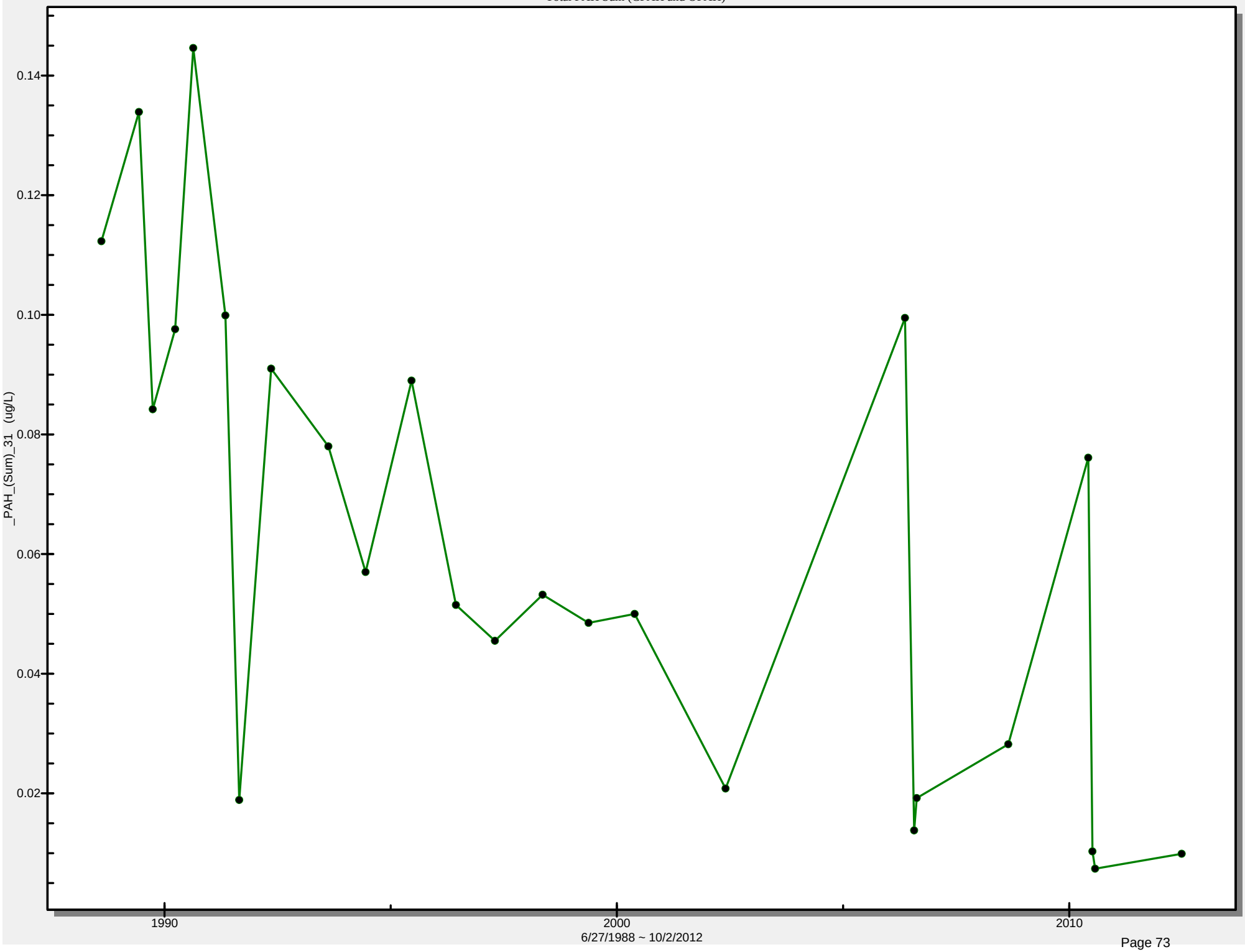
# Well SLP13

Total PAH Sum (CPAH and OPAH)



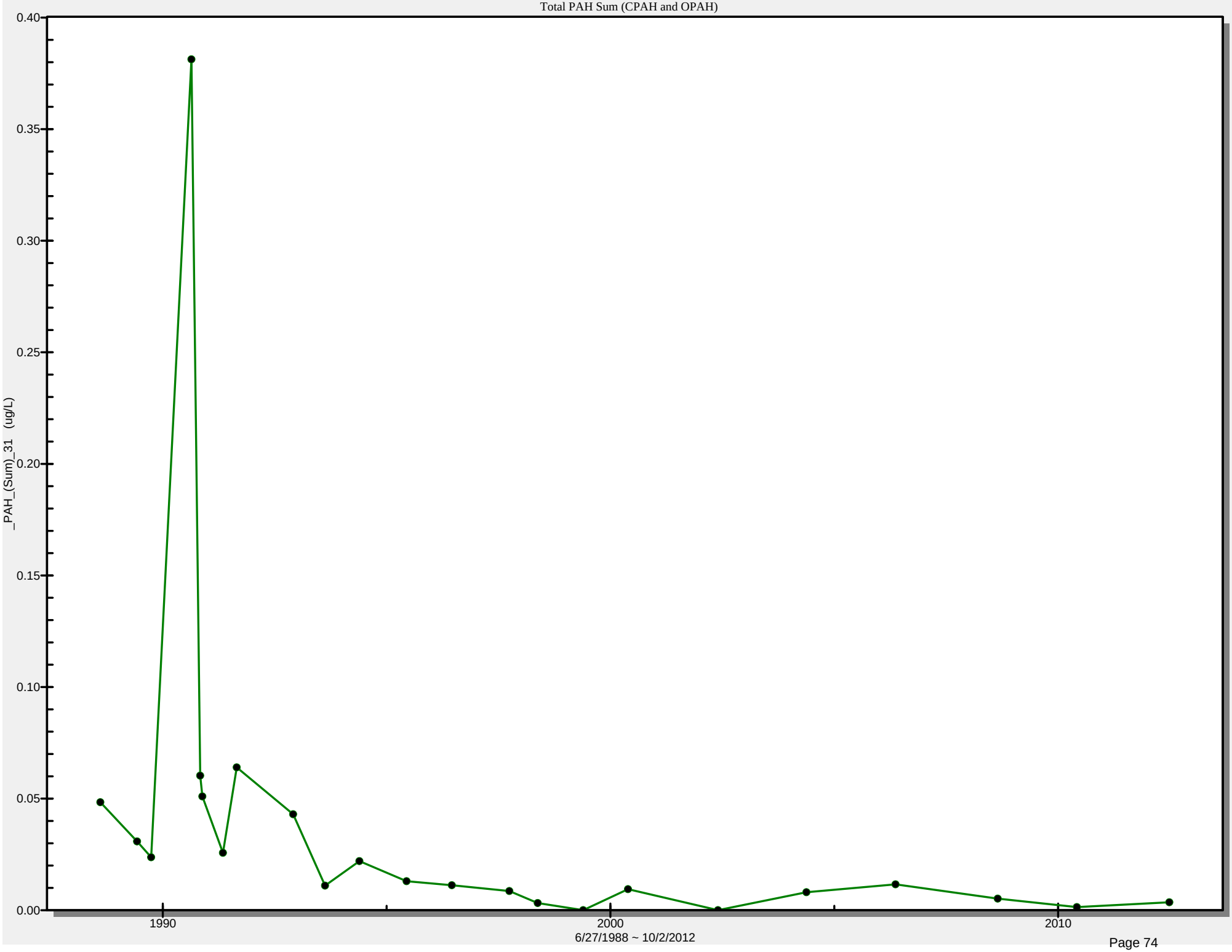
# Well SLP14

Total PAH Sum (CPAH and OPAH)



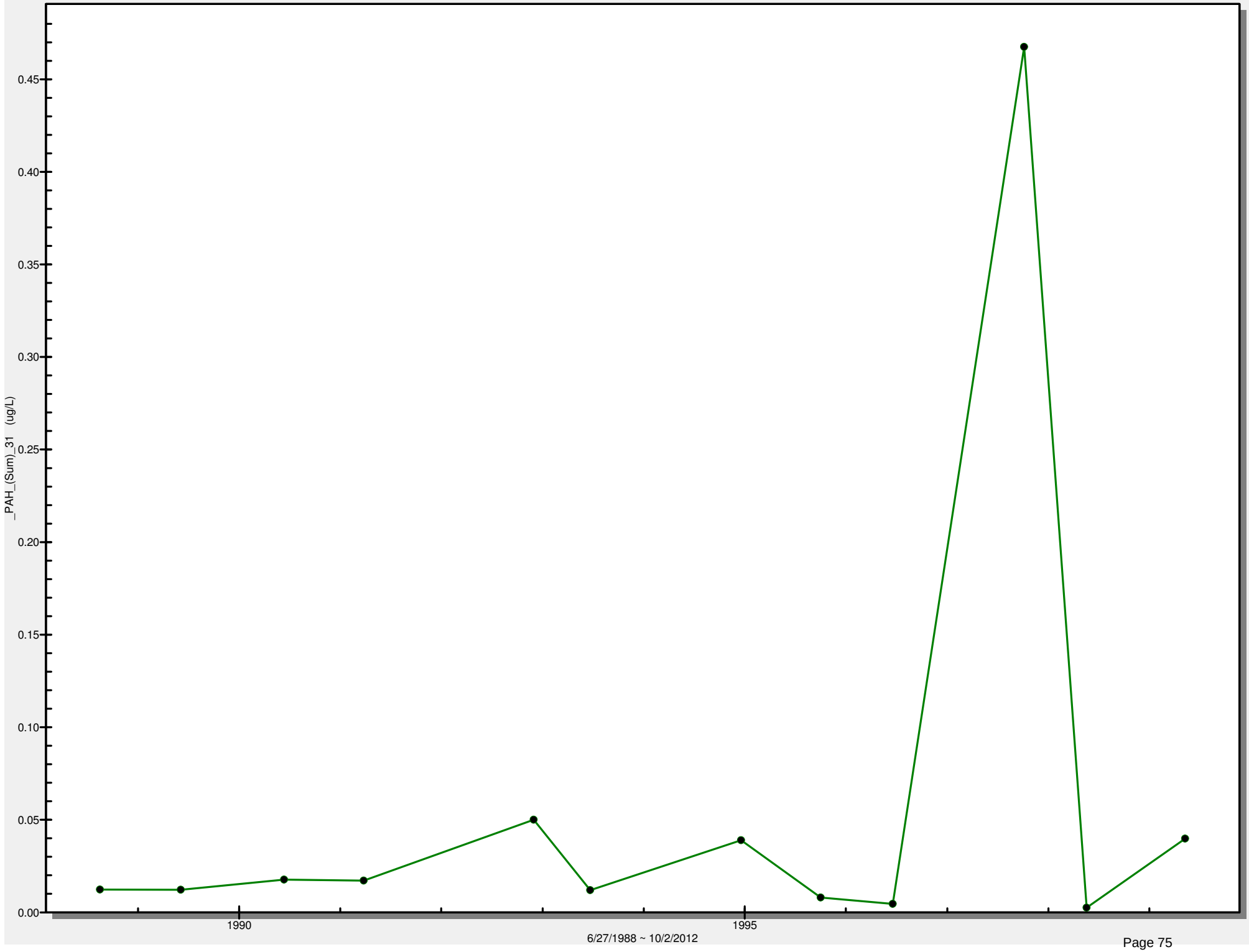
# Well SLP16

Total PAH Sum (CPAH and OPAH)



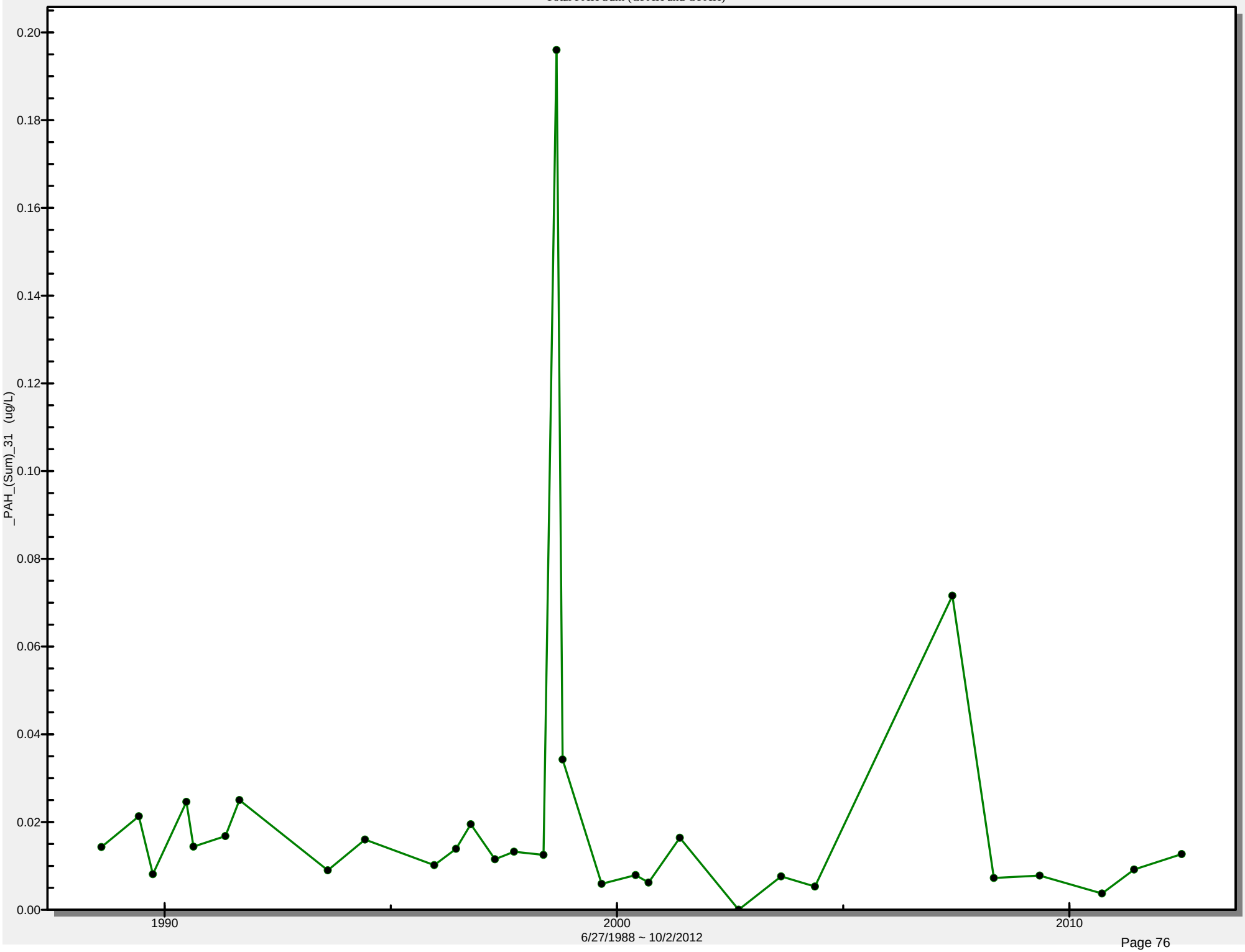
# Well SLP17

Total PAH Sum (CPAH and OPAH)



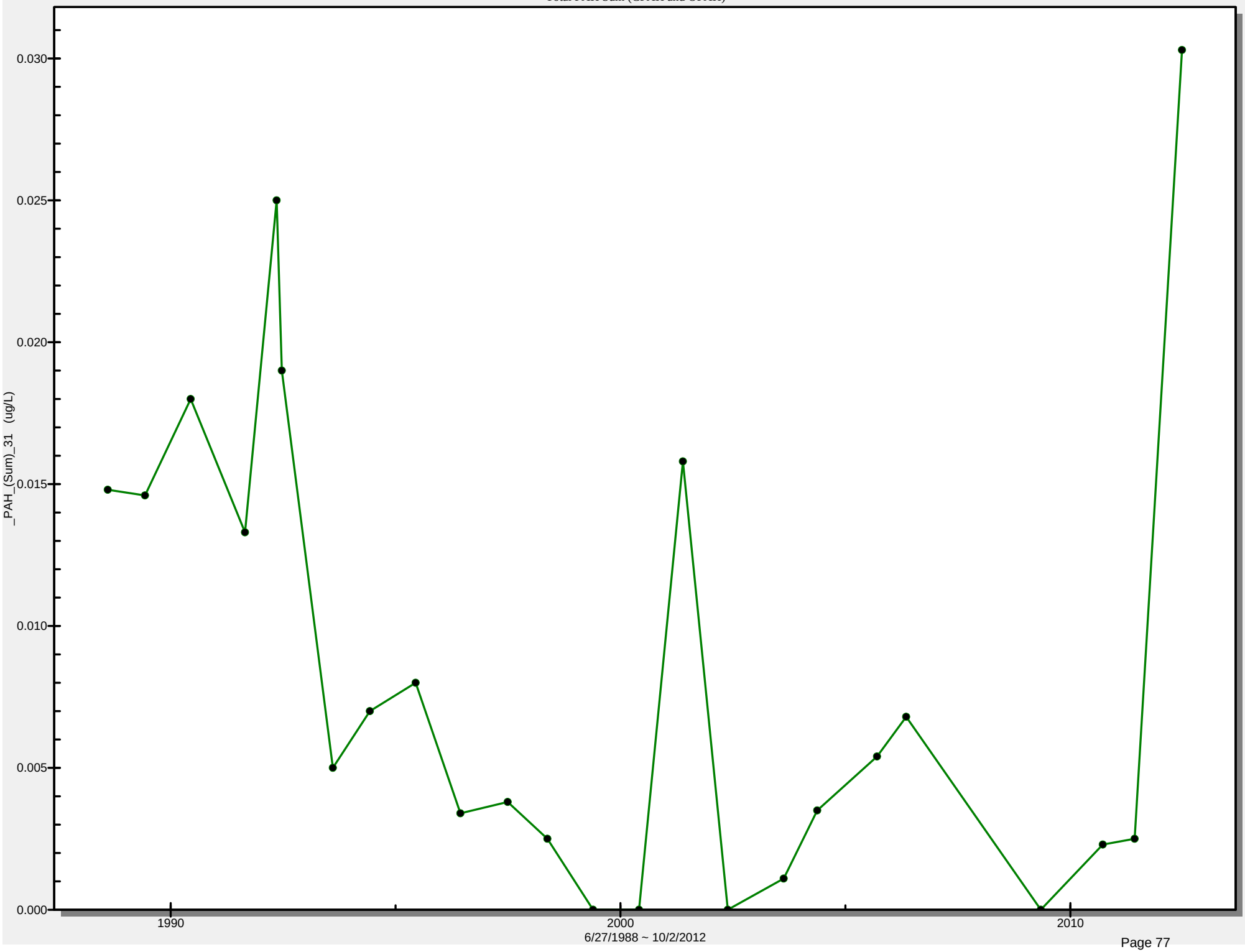
# Well E2

Total PAH Sum (CPAH and OPAH)



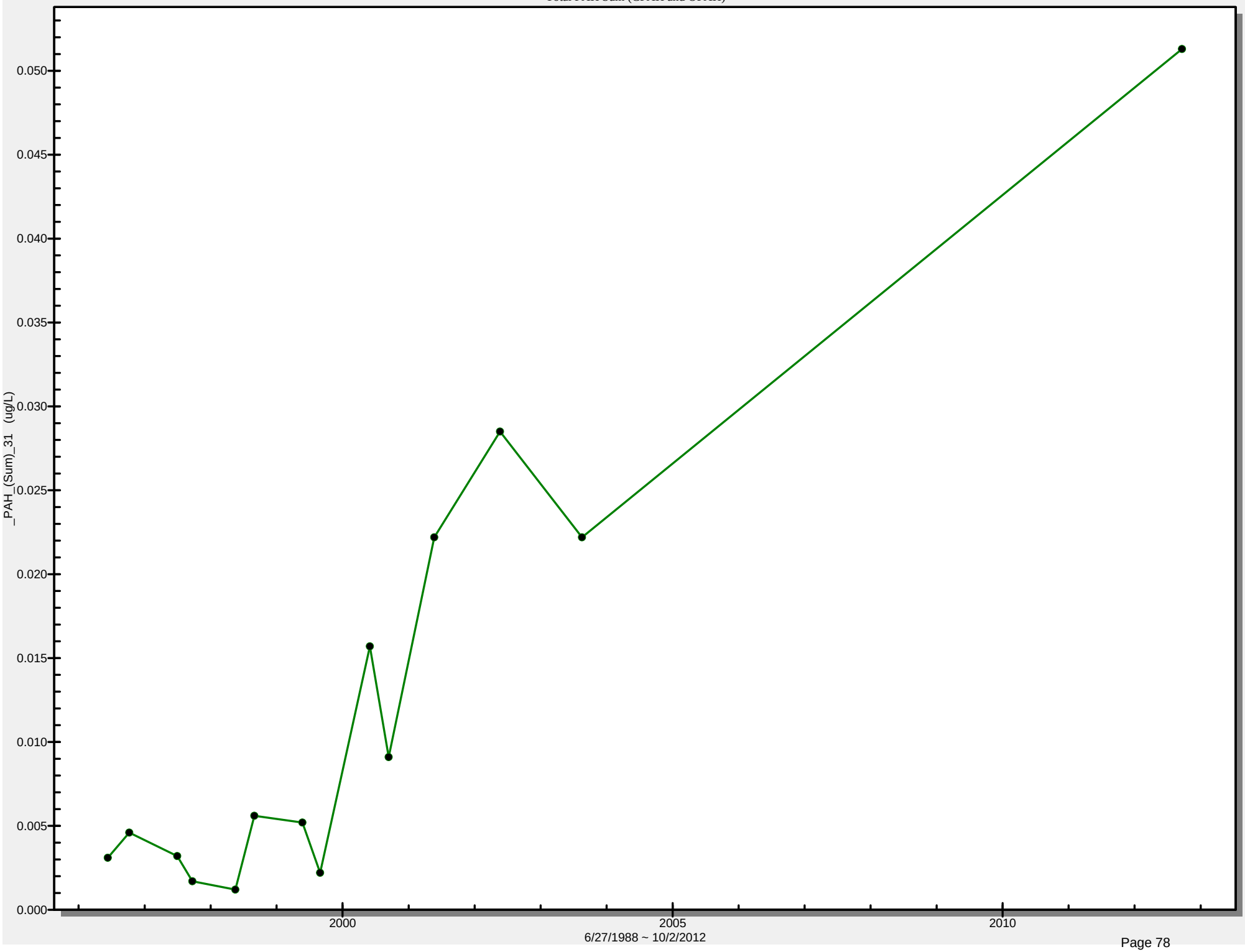
# Well E3

Total PAH Sum (CPAH and OPAH)



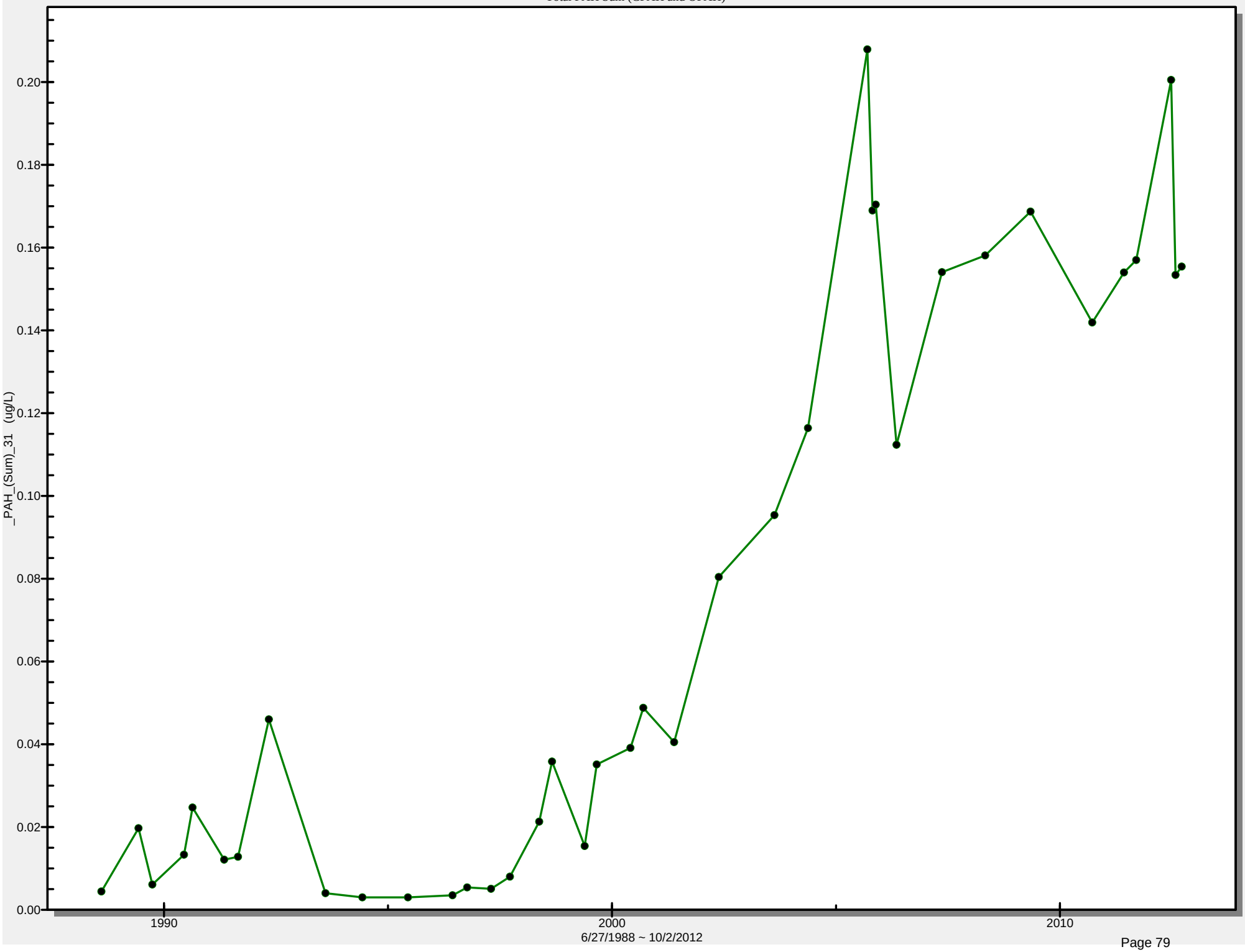
# Well E7

Total PAH Sum (CPAH and OPAH)



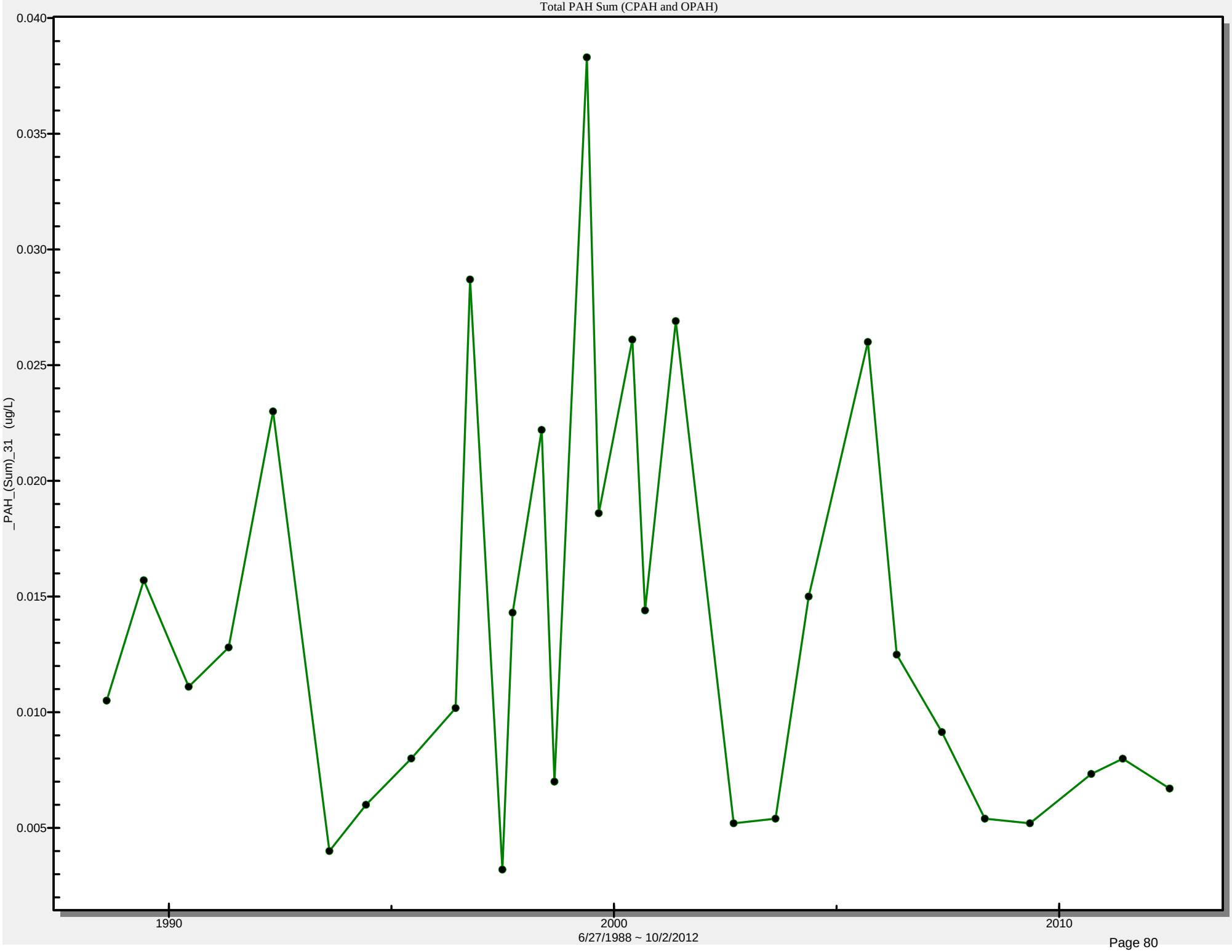
# Well E13

Total PAH Sum (CPAH and OPAH)



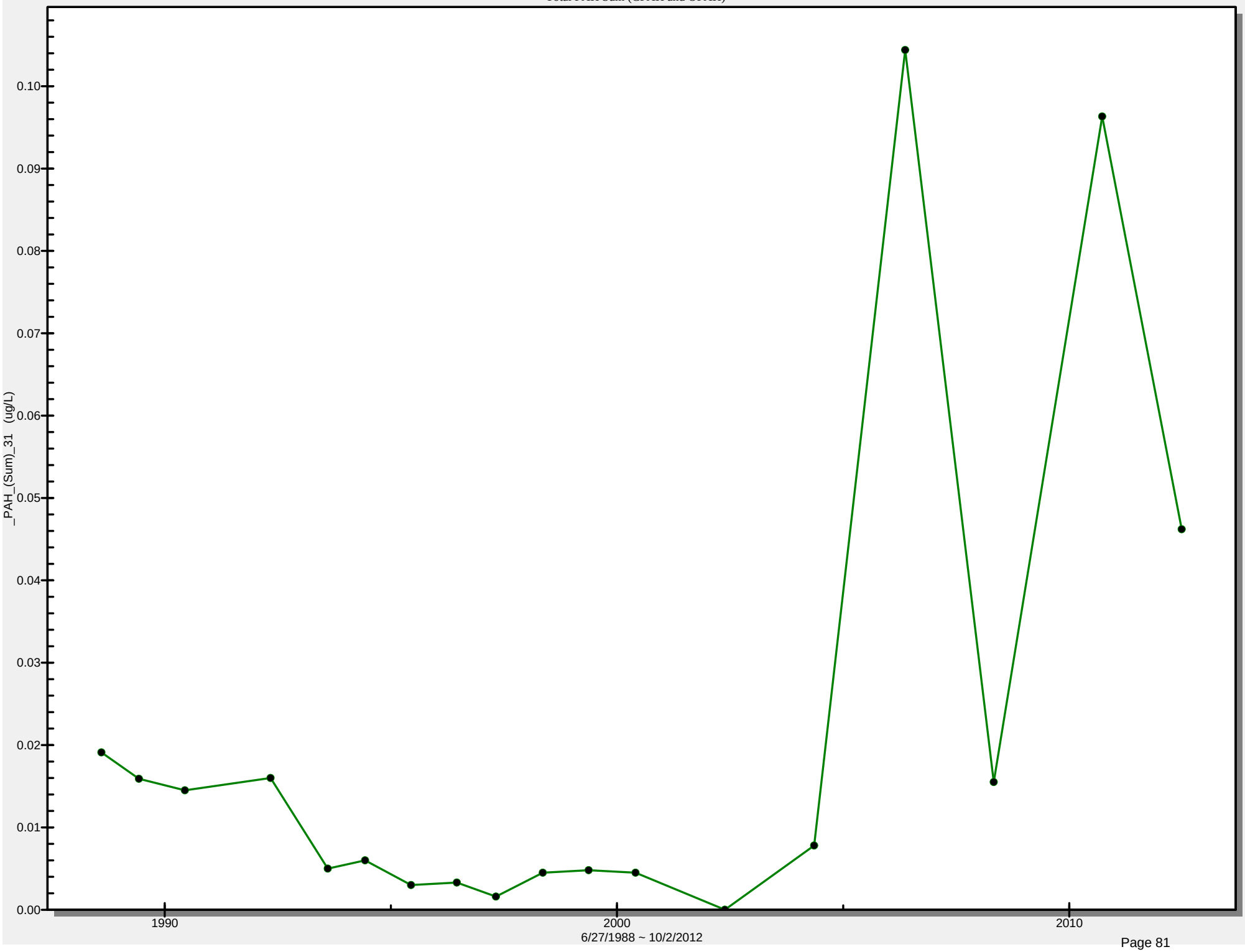
# Well E15

Total PAH Sum (CPAH and OPAH)



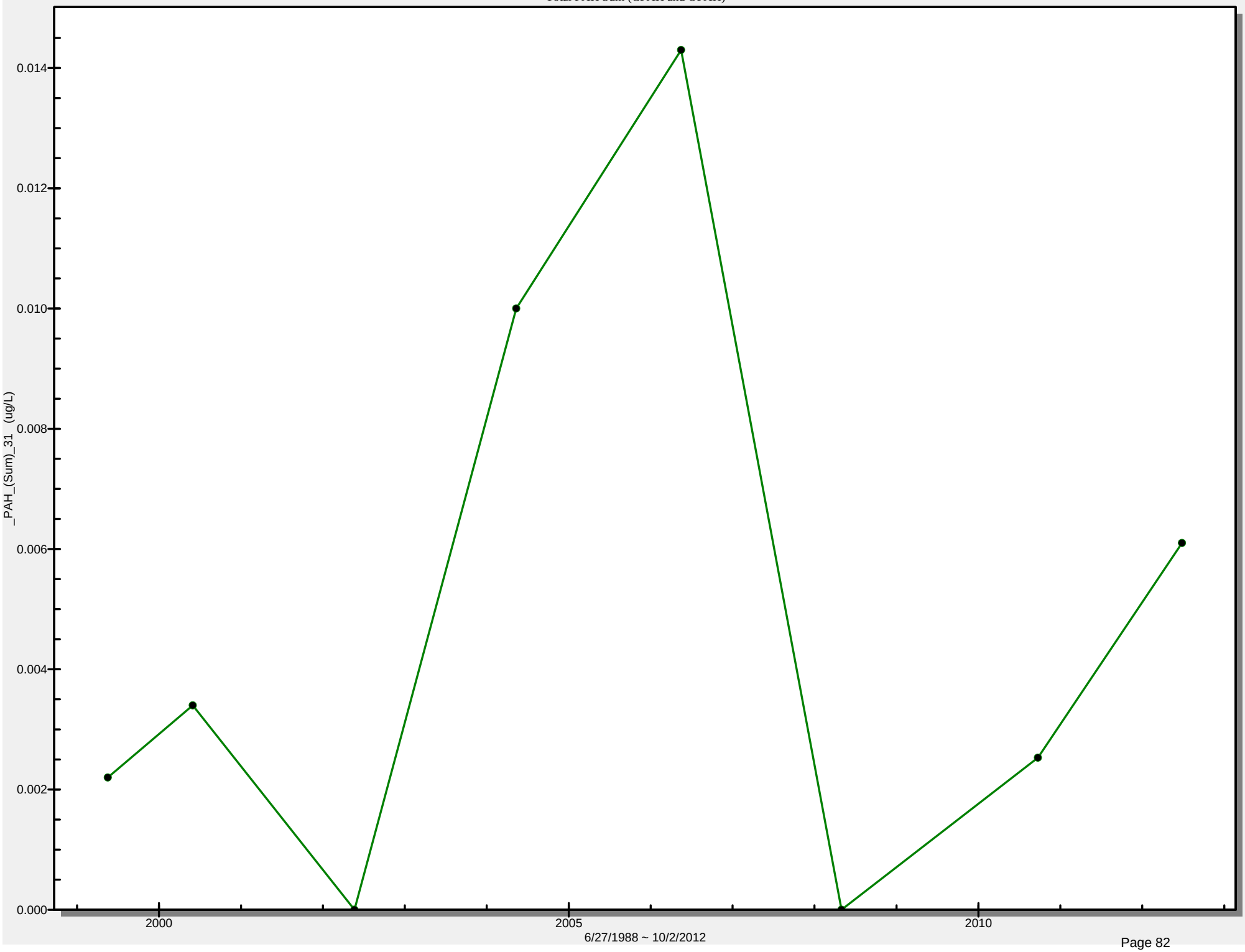
# Well H6

Total PAH Sum (CPAH and OPAH)



# Well MTKA6

Total PAH Sum (CPAH and OPAH)



# Attachment B

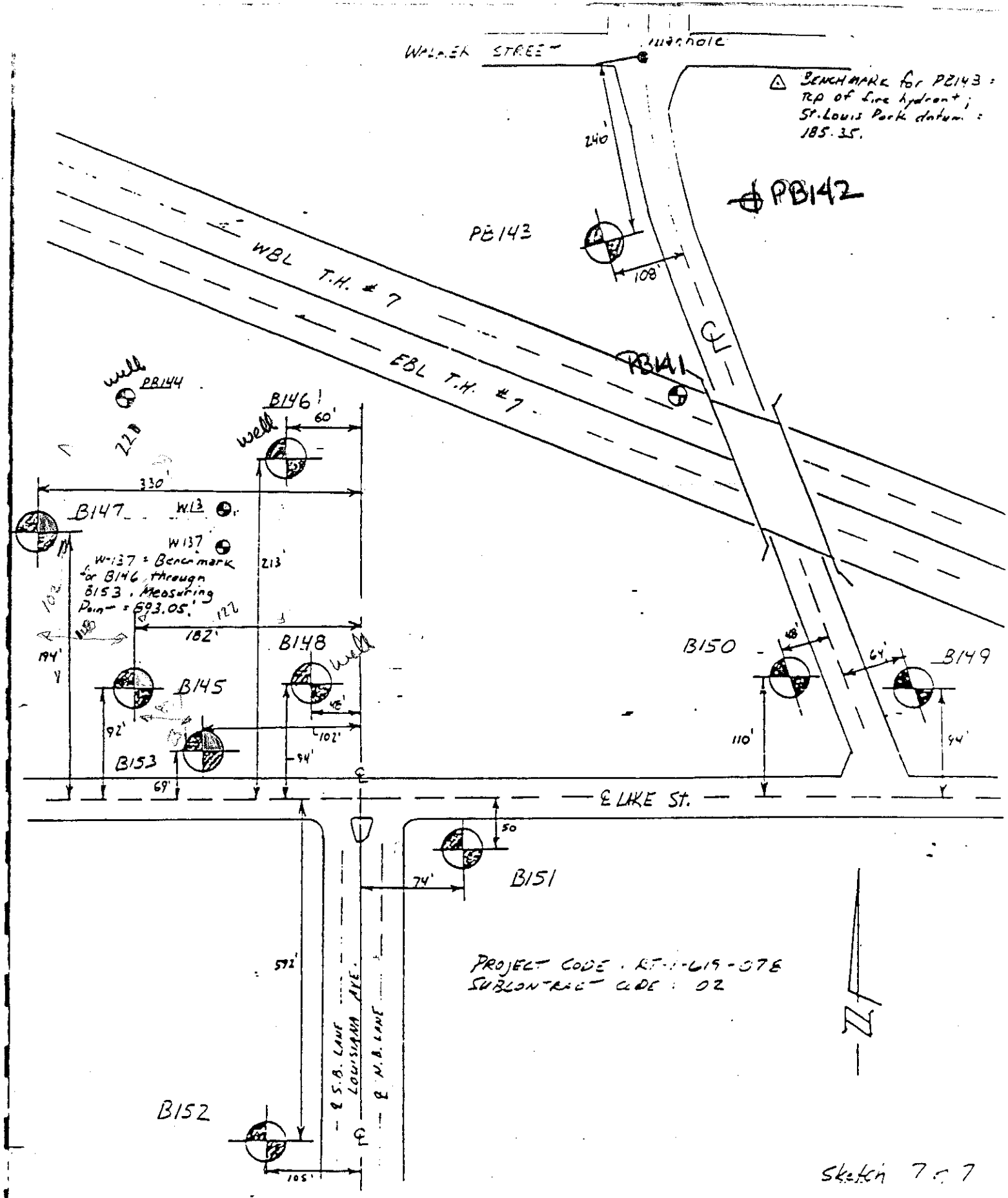
Attachment B
2011 Water Level Measurements

| WELL | DATE | MP Elevation | DEPTH TO WATER | WL Elev | | DATE | DEPTH TO WATER | WL Elev |
|---|---|---|---|---|---|---|---|---|
| *St. Peter* | | | | | | *St. Peter* | | |
| W14 | 6/14/2011 | 891.49 | 19.04 | 872.45 | | 10/28/2011 | 23.00 | 868.49 |
| W24 | | 893.19 | NM | NM | | 10/28/2011 | 25.90 | 867.29 |
| W33R | 6/14/2011 | 893.99 | 26.11 | 867.88 | | | NM | NM |
| W122 | 6/15/2011 | 918.58 | 58.90 | 859.68 | | 10/28/2011 | 58.17 | 860.41 |
| W129 | 6/14/2011 | 916.33 | 47.82 | 868.51 | | 10/28/2011 | 47.13 | 869.20 |
| W133 | | 921.06 | NM | NM | | | NM | NM |
| W408 | 6/15/2011 | 923.53 | 49.87 | 873.66 | | 10/28/2011 | 50.05 | 873.48 |
| W409 | 6/15/2011 | 923.61 | 53.88 | 869.73 | | | NM | NM |
| W410 | | 908.04 | NM | NM | | | NM | NM |
| W411 | 6/15/2011 | 896.25 | 31.82 | 864.43 | | | NM | NM |
| W412 | 6/15/2011 | 915.17 | 48.75 | 866.42 | | | NM | NM |
| W414 | 6/14/2011 | 919 | 55.01 | 863.99 | | | NM | NM |
| *Platteville* | | | | | | *Platteville* | | |
| P101 | | 926.37 | NM | NM | | 10/28/2011 | 38.53 | 887.84 |
| W1 | | 923.28 | NM | NM | | | NM | NM |
| W18 | | 893.33 | NM | NM | | | NM | NM |
| W20 | | 895.83 | NM | NM | | 10/28/2011 | 16.53 | 879.30 |
| W22 | | 897.06 | NM | NM | | 10/28/2011 | 10.54 | 886.52 |
| W27 | 6/10/2011 | 910.47 | 26.20 | 884.27 | | 10/28/2011 | 26.01 | 884.46 |
| W100 | | 899.71 | NM | NM | | | NM | NM |
| W101 | | 918.03 | NM | NM | | | NM | NM |
| W120 | | 919.81 | NM | NM | | | NM | NM |
| W121 | | 922.85 | NM | NM | | 10/28/2011 | 46.66 | 876.19 |
| W123 | | 909.36 | NM | NM | | | NM | NM |
| W124 | | 887.65 | NM | NM | | | NM | NM |
| W130 | 6/13/2011 | 894.83 | 20.35 | 874.48 | | 10/28/2011 | 20.15 | 874.68 |
| W131 | | 919.27 | NM | NM | | 10/28/2011 | 36.77 | 882.50 |
| W132 | | 904.95 | NM | NM | | | NM | NM |
| W143 | | 905.31 | NM | NM | | 10/28/2011 | 24.36 | 880.95 |
| W421 | | 895.86 | NM | NM | | | NM | NM |
| W424 | 6/13/2011 | 917.57 | 33.22 | 884.35 | | 10/28/2011 | 33.45 | 884.12 |
| W426 | 6/10/2011 | 923.95 | 39.88 | 884.07 | | | NM | NM |
| W428 | | 919.4 | NM | NM | | 10/28/2011 | 36.92 | 882.48 |
| W429 | | | | 0.00 | | | | 0.00 |
| W430 | | | | 0.00 | | | | 0.00 |
| W431 | | | | 0.00 | | | | 0.00 |
| W432 | | | | 0.00 | | | | 0.00 |
| W433 | | | | 0.00 | | | | 0.00 |
| W434 | | | | 0.00 | | | | 0.00 |
| W435 | | | | 0.00 | | | | 0.00 |
| W437 | | 913.18 | NM | NM | | 10/28/2011 | 29.16 | 884.02 |
| W438 | | 921.12 | NM | NM | | 10/28/2011 | 38.56 | 882.56 |

Attachment B
2011 Water Level Measurements

| WELL | DATE | MP Elevation | DEPTH TO WATER | WL Elev | | DATE | DEPTH TO WATER | WL Elev |
|---|---|---|---|---|---|---|---|---|
| *Drift* | | | | | | *Drift* | | |
| P109 | | 895.11 | NM | NM | | 10/28/2011 | 12.14 | 882.97 |
| P112 | | 903.8 | NM | NM | | 10/28/2011 | 21.82 | 881.98 |
| P117 | | | | 0.00 | | | | 0.00 |
| P307 | | 913.1 | | 913.10 | | 10/28/2011 | 29.39 | 883.71 |
| P308 | | 923.29 | NM | NM | | 10/28/2011 | 39.75 | 883.54 |
| P309 | 6/10/2011 | 925.16 | 42.02 | 883.14 | | 10/28/2011 | 41.80 | 883.36 |
| P310 | | 921.48 | NM | NM | | 10/28/2011 | 38.88 | 882.60 |
| P312 | | 919.45 | NM | NM | | 10/28/2011 | 38.17 | 881.28 |
| P313 | | 923.98 | NM | NM | | | NM | NM |
| W2 | 6/10/2011 | 897.96 | 10.40 | 887.56 | | 10/28/2011 | 10.62 | 887.34 |
| W9 | 6/10/2011 | 891.21 | 7.10 | 884.11 | | 10/28/2011 | 7.83 | 883.38 |
| W10 | | 892.03 | NM | NM | | 10/28/2011 | 8.10 | 883.93 |
| W12 | | | | 0.00 | | | | 0.00 |
| W15 | 6/10/2011 | 894.47 | 7.44 | 887.03 | | 10/28/2011 | 9.02 | 885.45 |
| W117 | | 917.75 | NM | NM | | 10/28/2011 | 37.60 | 880.15 |
| W128 | | 922.89 | NM | NM | | 10/28/2011 | 45.63 | 877.26 |
| W134 | | | | 0.00 | | | | 0.00 |
| W136 | | 919.17 | NM | NM | | 10/28/2011 | 36.10 | 883.07 |
| W420 | | 895.88 | NM | NM | | | NM | NM |
| W422 | | 908.04 | NM | NM | | | NM | NM |
| W423 | | 917.51 | NM | NM | | | NM | NM |
| W425 | | 923.81 | NM | NM | | | NM | NM |
| W427 | | 919.4 | NM | NM | | 10/28/2011 | 36.97 | 882.43 |
| W439 | | 924.9 | NM | NM | | | NM | NM |
| | | | | 0.00 | | | | |
| *Prairie Du Chien* | | | | | | *Prairie Du Chien* | | |
| W23 | | | | | | | | |
| W29 | | | | | | | | |
| W48 | | | | | | | | |
| W401 | | | | | | | | |
| W402 | | | | | | | | |
| W403 | | | | | | | | |
| W406 | | | | | | | | |
| SLP 3 | | | | | | | | |
| SLP 4 | | | | | | | | |
| SLP 5 | | | | | | | | |
| SLP 7 | | | | | | | | |
| SLP 8 | | | | | | | | |
| SLP 9 | | | | | | | | |
| SLP 10 | | | | | | | | |
| SLP 11 | | | | | | | | |
| SLP 12 | | | | | | | | |
| SLP 13 | | | | | | | | |
| SLP 14 | | | | | | | | |
| SLP 15 | | | | | | | | |
| SLP 16 | | | | | | | | |
| E2 | | | | | | | | |
| E 3 | | | | | | | | |
| E 4 | | | | | | | | |
| E 7 | | | | | | | | |
| E 13 | | | | | | | | |
| E 15 | | | | | | | | |
| H 6 | | | | | | | | |
| MTK 6 | | | | | | | | |

# Attachment C




Sketch 7 of 7

BRAUN

E82-091 LOCATIONS FOR PB143, B145, B146, B147 B146, B149, B150, B151, B152 and B153, Phase 2 DRILLING PROGRAM AT REILLY TAR SITE ST. LOUIS PARK MINNESOTA

# BORING LOG

| PROJECT | JOB NO. | SHEET NO. | HOLE NO. |
|---|---|---|---|
| Reilly Tar | 1-619-078 | 1 OF 2 | S 149 |

| SITE | COORDINATES | ANGLE FROM HORIZ. | BEARING |
|---|---|---|---|
| East Corner of Louisiana & Lake | | 90° | |

| BEGUN | COMPLETED | DRILLER | DRILL MAKE AND MODEL | HOLE SIZE | OVERBURDEN (ft) | ROCK (ft) | TOTAL DEPTH |
|---|---|---|---|---|---|---|---|
| 11/17 | 11/22/83 | Braun Engineering | CME 75 | 4" | 56.5' | 2' | 58.5' |

| CORE RECOVERY (ft, %) | CORE BOXES | SAMPLES | EL. TOP OF CASING | GROUND EL | DEPTH/EL. GROUND WATER | DEPTH/EL. TOP OF ROCK |
|---|---|---|---|---|---|---|
| | | 12 | | | | 56.5' |

| SAMPLE HAMMER WEIGHT/FALL | CASING LEFT IN HOLE DIA/LENGTH | LOGGED BY: |
|---|---|---|
| 140# 30" | - | P. Huidobro |

| SAMPLE TYPE AND DIAMETER | SAMPLER ADVANCE / LENGTH CORE RUN | SAMPLE RECOVERY / CORE RECOVERY | SAMPLE BLOWS "N" / PERCENT CORE RECOVERY | PENETRATION BLOWS 1st 6" | 2nd 6" | 3rd 6" | 4th 6" | ELEVATION | DEPTH, ft | GRAPHIC LOG | SAMPLE | DESCRIPTION AND CLASSIFICATION | NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC. | SAMPLE NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 0-6' very coarse brown sand with medium grain gravel. Fill. No sign of contaminants. | Started @ ≈12:00. | |
| SS | 2' | 0.5' | 33 | 4 | 11 | 14 | 8 | | 5 | | 1 | | Changed to smaller core catcher after sample 3. | - |
| | | | | | | | | | | | | 6'-12' soft black peat. No sign of contaminants. | | |
| SS | 2' | 0 | 12 | 2 | 3 | 4 | 5 | | 10 | | 2 | | Casing problems @ ≈15. Damaged 5' section changed. | - |
| | | | | | | | | | | | | 12'-20' very coarse gray sand with medium gravel. Mostly rock fragments. LS & mafic rocks. Creosote odor. | Boulder @ 30'. BB thru it. Pulled all casing to introduce 5"7/8 roller bit. Drilled thru a 3.5' boulder ≈ 32'. | |
| SS | 2' | 0.8' | 28 | 16 | 11 | 9 | 8 | | 15 | | 3 | | | 3 |
| SS | 2' | 0 | 26 | 7 | 8 | 9 | 10 | | 20 | | 4 | | | - |
| | | | | | | | | | | | | 20'-25' very fine silty sand, gray. No sign of contaminants. | Bedrock ? 56.5'. | |
| SS | 2' | 0 | 64 | 21 | 20 | 24 | 20 | | 25 | | 5 | | Finished 11/22 @ 10:00. | - |
| | | | | | | | | | | | | 25'-35' grey till. Clayey silty sand with some gravel of medium size. Becomes more clay rich at the bottom. No sign of contaminatin. | | |
| SS | 2' | 2.0' | 61 | 37 | 21 | 19 | 21 | | 30 | | 6 | | | - |
| SS | 2' | 0.5' | 36 | 19 | 9 | 10 | 17 | | 35 | | 7 | | | - |
| | | | | | | | | | | | | 35'-42' poorly sorted fine to medium sand with some gravel (granitic and mafic rocks), agate chips. No sign of contaminants. Brown. | | |
| SS | 2' | 1.6' | 49 | 15 | 14 | 16 | 19 | | 40 | | 8 | | | 8 |
| | | | | | | | | | | | | 42'-47'. Moderately sorted very coarse sand. Mostly rock fragments. Brown. Creosote smell. | | |
| SS | 2' | 2.0' | 103 | 30 | 30 | 33 | 40 | | 45 | | 9 | | | 9 |

SS = SPLIT SPOON; ST = SHELBY TUBE
D = DENNISON; P = PITCHER; O = OTHER

SITE: East Corner of Louisiana & Lake

HOLE NO: S 149

FORM 0016

# BORING LOG

PROJECT: Reilly Tar | JOB NO 1-61-378 | SHEET NO 1 OF 2 | HOLE NO B 149

| SAMPLE TYPE AND DIAMETER | SAMPLER ADVANCE | LENGTH CORE RUN / SAMPLE RECOVERY | CORE RECOVERY | SAMPLE BLOWS "N" | PERCENT CORE RECOVERY | PENETRATION BLOWS 1st 6" | 2nd 6" | 3rd 6" | 4th 6" | ELEVATION | DEPTH, ft | GRAPHIC LOG | SAMPLE | DESCRIPTION AND CLASSIFICATION | NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC | MONITOR WELL NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SS | 2' | 1.9' | 101 | | 20 | 19 | 36 | 46 | | | | | | 47'-49' brown sand. No contaminants. | | - |
| | | | | | | | | | | | 50 | | | 49'-56.5' red silt sandy, clayey silt. Fine gravel of mafic rock and LS. No sign of contamination. | | |
| SS | 2' | 2.0' | 196 | | 59 | 76 | 62 | 58 | | | | | | | | - |
| | | | | | | | | | | | 55 | | | 56.5'-58.5 weathered limestone. Clean. | | |
| SS | 0.5' | 0.5' | | | 300 | | | | | | | | | Bottom of hole =58.5'. | | - |
| | | | | | | | | | | | 60 | | | | | |

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: East Corner of Louisiana & Lake

HOLE NO B 149

FORM 1003B

ENSR W-33R

# MINNESOTA DEPARTMENT OF HEALTH
# WELL AND BORING RECORD
*Minnesota Statutes, Chapter 103I*

MINNESOTA UNIQUE WELL AND BORING NO.: 753534

**WELL OR BORING LOCATION**

County Name: Hennepin

| Township Name | Township No. | Range No. | Section No. | Fraction |
|---|---|---|---|---|
| St. Louis Park | 28N | 21W | 17 | NE SW |

GPS LOCATION: Latitude ____ degrees ____ minutes ____ seconds ____ Longitude ____ degrees ____ minutes ____ seconds ____

[redacted] or Fire Number

Show exact location of well/boring in section grid with "X." Sketch map of well/boring location.

[redacted]

PROPERTY OWNER'S NAME/COMPANY NAME: City of St. Louis Park

Property owner's mailing address if different than well location address indicated above.

5005 Minnetonka Blvd
St. Louis Park, MN 55416

WELL OWNER'S NAME/COMPANY NAME: City of St. Louis Park

Well/boring owner's mailing address if different than property owner's address indicated above.

WELL/BORING DEPTH (completed): 183 ft.

DATE WORK COMPLETED: July 17, 2007

DRILLING METHOD: ☐ Cable Tool ☐ Driven ☐ Dug ☐ Auger ☒ Rotary ☐ Jetted ☐ ____

DRILLING FLUID: bentonite

WELL HYDROFRACTURED? ☐ Yes ☒ No From ____ ft. To ____ ft.

USE: ☐ Domestic ☒ Monitoring ☐ Heating/Cooling ☐ Noncommunity PWS ☐ Environ. Bore Hole ☐ Industry/Commercial ☐ Community PWS ☐ Irrigation ☐ Remedial ☐ Elevator ☐ Dewatering ☐ ____

CASING MATERIAL: ☒ Steel ☐ Plastic 4" Drive Shoe? ☒ Yes ☐ No ☒ Threaded ☒ Welded ☐ ____

HOLE DIAM.: 10" in. to 90 ft.; 7/8 in. to 163 ft.

| CASING Diameter | | | Weight | | Specifications |
|---|---|---|---|---|---|
| 10 | in. to 0 | ft. | 90 | lbs./ft. | |
| 4 | in. to 0 | ft. | 163 | lbs./ft. | 9 |
| | in. to | ft. | | lbs./ft. | |

SCREEN: Make ____ Type ____ Slot/Gauze ____ Set between ____ ft. and ____ ft.
Diam. ____ Length ____ FITTINGS ____

OPEN HOLE: From 163 ft. To 183 ft.

STATIC WATER LEVEL: 45 ft. ☒ Below ☐ Above land surface Measured from grade Date measured 7/16/07

PUMPING LEVEL (below land surface): ____ ft. after ____ hrs. pumping 30+ g.p.m.

WELLHEAD COMPLETION
☐ Pitless/adapter manufacturer ____ Model ____
☒ Casing Protection 10" x 90 ☒ + in. above grade 24"
☐ At-grade (Environmental Well and Boring ONLY)

GROUTING INFORMATION
Well grouted ☒ Yes ☐ No
Grout materials ☒ Neat cement ☐ Bentonite ☐ Concrete ☐ Other ____

| | | | | |
|---|---|---|---|---|
| 10" | From 0 To 90 ft. | 58 | ☐ Yds. | ☒ Bags |
| 4" | From 0 To 163 ft. | 70 | ☐ Yds. | ☒ Bags |
| | From ____ To ____ ft. | ____ | ☐ Yds. | ☐ Bags |

NEAREST KNOWN SOURCE OF CONTAMINATION: ____ feet ____ direction ____ type

Well disinfected upon completion? ☐ Yes ☒ No

PUMP: ☒ Not installed Date installed ____
Manufacturer's name ____
Model Number ____ HP ____ Volts ____
Length of drop pipe ____ ft. Capacity ____ g.p.m.
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ ____

ABANDONED WELLS: Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

VARIANCE: Was a variance granted from the MDH for this well? ☐ Yes ☒ No TN# ____

| GEOLOGICAL MATERIALS | COLOR | HARDNESS OF MATERIAL | FROM | TO |
|---|---|---|---|---|
| backfill | black | | 0 | 10 |
| gravel & sand | mixed | | 10 | 70 |
| rock | gray | hard | 70 | 87 |
| shale | gray | | 87 | 92 |
| sandstone | yellow | soft | 92 | 100 |
| sandstone | white | soft | 100 | 150 |
| sandstone | white | hard | 150 | 183 |

*Use a second sheet, if needed.*

REMARKS, ELEVATION, SOURCE OF DATA, etc.

W33R

WELL CONTRACTOR CERTIFICATION
This well was drilled under my supervision and in accordance with Minnesota Rules, Chapter 4725. The information contained in this report is true to the best of my knowledge.

Stevens Drilling & Env. Svc Inc — 2255
Licensee Business Name — Lic. or Reg. No.

Certified Representative Signature — 86654 — 7/19/07
Certified Rep. No. — Date

Randy Johnson
Name of Driller

IMPORTANT - FILE WITH PROPERTY PAPERS
WELL OWNER COPY

753534

IC 140-0020

HE-01205-10 (Rev. 6/06)

*Minnesota Unique Well No.*
**165578**

**County** Hennepin
**Quad** Minneapolis South
**Quad ID** 104A

**MINNESOTA DEPARTMENT OF HEALTH**
# WELL AND BORING RECORD
***Minnesota Statutes Chapter 103I***

**Entry Date** 08/24/1991
**Update Date** 06/03/2004
**Received Date**

**Well Name** U.S.G.S. WELL W-122
**Township Range Dir Section Subsections Elevation** 920 **ft.**
117 21 W 21 BADBCD **Elevation Method** 7.5 minute topographic map (+/- 5 feet)

| Well Depth | Depth Completed | Date Well Completed |
|---|---|---|
| 239 **ft.** | 239 **ft.** | 08/06/1979 |

**Drilling Method** --

**Well Address**
ST LOUIS PARK MN

**Drilling Fluid** --

**Well Hydrofractured?** ☐ Yes ☐ No
From Ft. to Ft.

**Use** Other (specify in remarks)

| Geological Material | Color | Hardness | From | To |
|---|---|---|---|---|
| SAND & GRAVEL | YELLOW | | 0 | 33 |
| CLAY & GRAVEL | TAN | | 33 | 55 |
| SAND | BROWN | | 55 | 70 |
| MUDDY SAND & GRAVEL | BROWN | | 70 | 120 |
| SANDSTONE & GRAVEL | WHITE | | 120 | 237 |
| SHALE | BRN/GRN | | 237 | 239 |

**Casing Type** **Joint** No Information **Drive Shoe?** ☐ Yes ☐ No **Above/Below** 0 **ft.**

| Casing Diameter | Weight | Hole Diameter |
|---|---|---|
| 4 in. to 217 ft. | lbs./ft. | |

**Open Hole** from 217 ft. to 239 ft.

**Screen** NO **Make** **Type**

| Diameter | Slot/Gauze | Length | Set Between |
|---|---|---|---|

**Static Water Level**
35 ft. from Land surface Date Measured 08/06/1979

**PUMPING LEVEL (below land surface)**
35 ft. after hrs. pumping 15 g.p.m.

**Well Head Completion**
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

***REMARKS***
GAMMA LOGGED 10/9/79.

**Grouting Information** Well Grouted? ☐ Yes ☐ No

**Located by:** Minnesota Geological Survey
**Method:** Digitized - scale 1:24,000 or larger (Digitizing Table)
**Unique Number Verification:** N/A
**Input Date:** 01/01/1990
**System:** *UTM - Nad83, Zone15, Meters*
**X:** 472170 **Y:** 4975504

**Nearest Known Source of Contamination**
_feet _direction _type
Well disinfected upon completion? ☐ Yes ☐ No

**Pump** ☐ Not Installed Date Installed
Manufacturer's name Model number __ HP 0_ Volts
Length of drop Pipe _ft. Capacity _g.p.m Type Material

**Abandoned Wells** Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

**Variance** Was a variance granted from the MDH for this well? ☐ Yes ☐ No

**Borehole Geophysics** Yes
**First Bedrock** St.Peter Sandstone
**Last Strat** St.Peter Sandstone
**Aquifer** St.Peter
**Depth to Bedrock** 120 **ft.**

**Well Contractor Certification**

| Renner E.H. & Sons | 02015 | |
|---|---|---|
| License Business Name | Lic. Or Reg. No. | Name of Driller |

**County Well Index Online Report** **165578** Printed 8/21/2012
HE-01205-07

# Preliminary Evaluation of Ground-Water Contamination by Coal-Tar Derivatives, St. Louis Park Area, Minnesota

By MARC F. HULT and MICHAEL E. SCHOENBERG

Prepared in cooperation with the
Minnesota Department of Health

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2211

**Table 1.** Data on selected wells in the St. Louis Park area, Minnesota—Continued

| Township and range | Site identification (lat and long) | Minnesota unique well number | USGS project well number | Owner name or other identifiers | Driller | Date drilled | Reported log, in feet | Land surface altitude, in feet | Reported depth of well, in feet | Diameter, in inches, and depth, in feet, of casing | Aquifer(s) open to well bore | Water level, in feet | Date measured | Field measurement status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 117.21.16 DCB3. | 445634093205903 | 160030 | W116 | ------- do ------- | E. H. Renner | -04-79 | 0–67 Qd | 909.59 | 67 | 0–4 in. 0–63 | Qd | 35.01 | 06-05-79 | O |
| 117.21.16 CDB3. | 445617093211502 | 160031 | W117 | ------- do ------- | ----- do ----- | -04-79 | 0–72 Qd | 917.73 MP | 72 | 4 in. 0–68 | Qd | 39.68 | 06-05-79 | O |
| 117.21.20 CDC1. | 445516093222501 | 216088 | W118 | Minneapolis Park Board–Meadowbrook Golf Course. | ----- do ---------- | | 0–80 Qd 80–89 Opl 89–245 Osp 245–370 Opc 370–485 €j 485–487 €sl | 905 | 487 | --- | Opc-€sl | --- | --- | --- |
| 117.21.20 DAC1. | 445527093215201 | 216009 | W119 | ------- do ------- | ---------- | -06-35 | 0–74 Qd 74–82 Opl 82–90 Ogl 90–252 Osp 252–375 Opc 375–465 €j 465–502 €sl | 890 | 502 | 16 in. 0–77 12 in. 77–257 | Opc-€sl | 54.5 | 06-28-35 | --- |
| 117.21.16 DCA2. | 445014093212802 | 165516 | W120 | Monitoring well | E. H. Renner | -07-79 | 0–95.5 Qd 95.8–98 Opl, (weathered) 98–107 Opl 107–108.6 Ogl | 919.8 MP | 105.7 | 4 in. 0–98 | Opl | 38.84 | 07-12-79 | G,O |
| 117.21.21 BBD1. | 445558093212001 | 165577 | W121 | ------- do ------- | ----- do ----- | -07-79 | 0–110 Qd 110–115 Opl, (weathered) 115–117 Ogl | 918 | 113.25 | 4 in. 0–109 | Opl | 53.58 | 07-18-79 | G,O |
| 117.21.21 BAD1. | 445557093210901 | 165578 | W122 | ------- do ------- | ----- do ----- | -08-79 | 0–120 Qd 120–212 Osp 212–239 Ospl | 920 | 239 | 4 in. 0–217 | --- | --- | --- | G,O |
| 117.21.21 BBC1. | 445559093213201 | 216129 | W140 | Cambridge Brick | ---------- | | --- | --- | --- | 4 in. | Opl? | --- | --- | D |
| 117.21.17 DDD5. | 445607093214203 | 216051 | W143 | 6425 Oxford St. | ---------- | | 0–70 Qd 70–90 Opl | --- | --- | 4 in. 0–70 | Opl | --- | --- | G |
| 28.24.06 BCD2. | 445634093204102 | 216128 | W144 | Interior Elevator | ---------- | | --- | --- | --- | --- | --- | --- | --- | F |

# NUCLEAR LOG

TYPE: Natural GAMMA DATE: 9 Oct '79

LOCATION: State MINN County Hennepin Town St Louis Park

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

District or Project:

FILE LOCATION NO.:



## LOGGING INFORMATION

Operator(s) USGS - Mc Cullough
Equipment Address: DFC Denver / Colo
Logger type: Well Recon No. Comprobe
Tool type: do
Detector type:
Source type:
Source size: C; MC
Source spacing:
Tool length, cable head to detector .11 ft in
Calibration: See log cps
Logging speed: 17 ft/min up down
Log vert. scale: 20 ft/in

## MODULE SETTINGS

Scale switch (rate or counts): 0-50 cps } chart div (or)
full scale
(circle as applicable)

T. C. switch: 4 sec.
Position Pot. (Base, zero, or suppression): 10 Dial Div.
Sensitivity Pot. (Span): 10 Dial Div.
Discrimination Pot.: 8.58 Dial Div.
Input pulse: 12 volts; Polarity Neg
Output switch: normal; reverse
Actual scale: cps } chart div (or)
API } full scale
(circle as applicable)

## RECORDER SETTINGS

| | Ch 1 | Ch 2 | Ch 3 |
|---|---|---|---|
| Position Pot.: | | | |
| Sensitivity Pot.: | | | |

Run No. of

Remarks:

## WELL INFORMATION

Well No. (USGS): Well W122 St. Louis Pan
Other:
Map or Quad
Site description

Agency or Owner: USGS
Address:
Altitude of L.S.
Log M.P. Top 4" Log TD 232 ft
Btm log interval: ft Well TD: 239 ft
Top log interval: ft
Type of finish:
Casing: Elev. of top ft/in Above Below L.S.

I.D. 4", from 3.6 to 217, type
I.D. , from to , type
I.D. , from to , type

Cement: from to

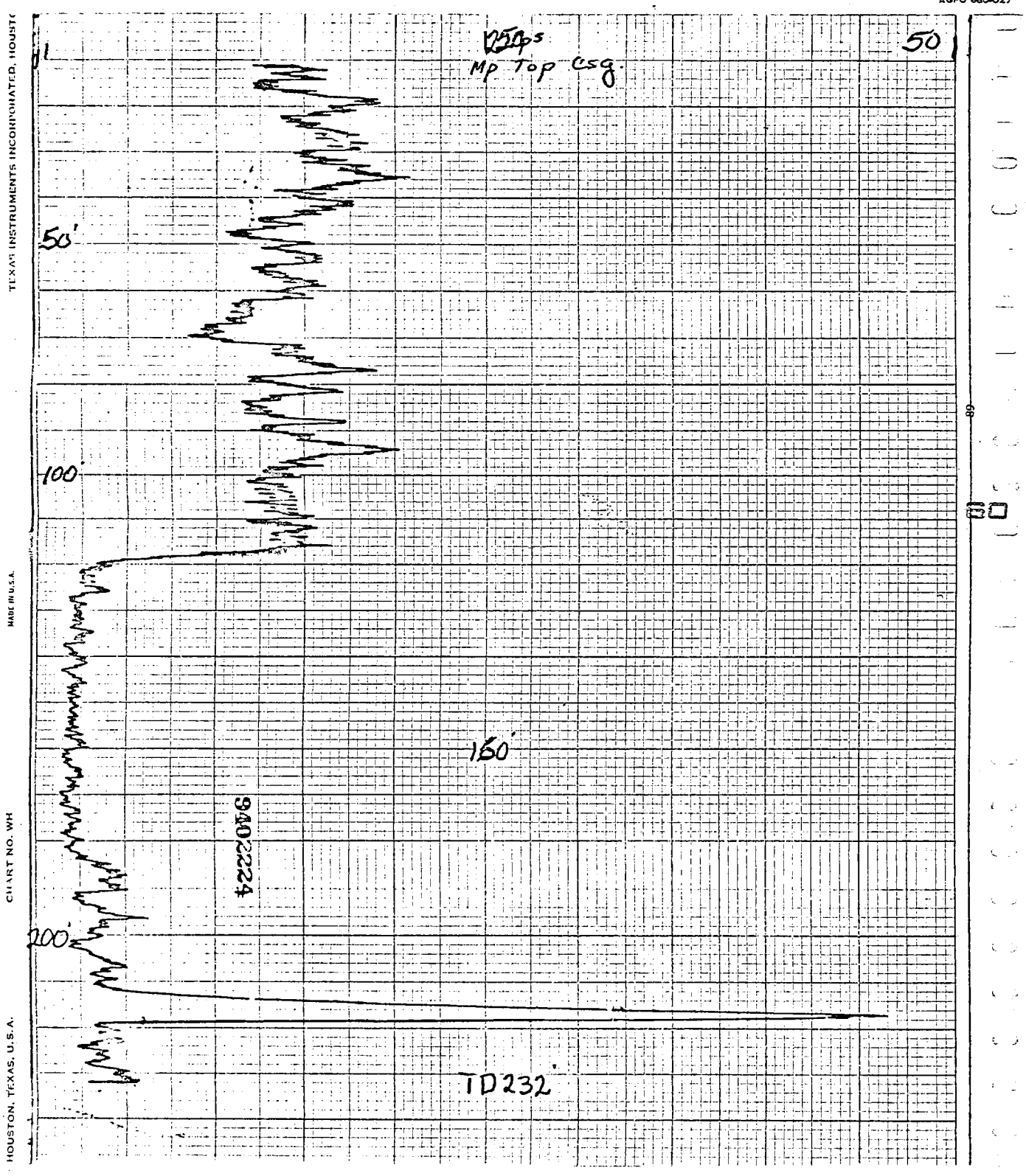
Perf. interval(s) from to , type
Open hole diameter: from to
from to

Fluid level: ft/in Above At Below L.S., Top Csg
Fluid type: temp °F, °C
Fluid resist.: ohm-m
Driller:
Address:
Type of rig:
Date started: completed
Aquifer or formation:

NOTE: This log is not to be used to fulfill private contractua obligations.

Other data and logs available for this well:

☆GPO 680-027



# NUCLEAR LOG

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

PE: Neutron DATE: 9 Oct 79

District or Project:

CONFIDENTIAL PURSUAN TO COURT ORDER

CATION: State MINN County Hennepin Town St Louis Park FILE LOCATION NO.:

## LOGGING INFORMATION

erator(s) USGS McCullough
uipment Address: DFC Denver Colo
gger type: Well Recon No. Comp abe
ol type: do
tector type: scintillation
urce type: AmEq
urce size: 3 C; MC
urce spacing: 10" spacer
ol length, cable head to detector 11 ft in
libration: See log cps
gging speed: 17 ft/min up down
g vert. scale: 20 ft/in

## MODULE SETTINGS

ale switch (rate or counts): 0-100 cps } chart div (or)
0-500 } full scale
(circle as applicable)

C. switch: 4 sec.
sition Pot. (Base, zero, or suppression) 10 ¢ 95 Dial Div.
nsitivity Pot. (Span): 40 ¢ 35 Dial Div.
scrimination Pot.: 858 Dial Div.
put pulse: 1.2 volts; Polarity Neg
tput switch: normal; reverse
tual scale: cps } chart div (or)
API } full scale
(circle as applicable)

## RECORDER SETTINGS

| | Ch 1 | Ch 2 | Ch 3 |
|---|---|---|---|
| sition Pot.: | | | |
| nsitivity Pot.: | | | |

n No. of

marks:

## WELL INFORMATION

Well No. (USGS): Well W122 ST Louis Park
Other:
Map or Quad
Site description

Agency or Owner: USGS
Address:
Altitude of L.S.
Log M.P. Top Csg Log TD 231 ft
Btm log interval: ft Well TD: 239 ft
Top log interval: ft
Type of finish:
Casing: Elev. of top ft/in Above Below L.S.

I.D. 4", from 3.6' to 217, type Steel
I.D. , from to , type
I.D. , from to , type

Cement: from to

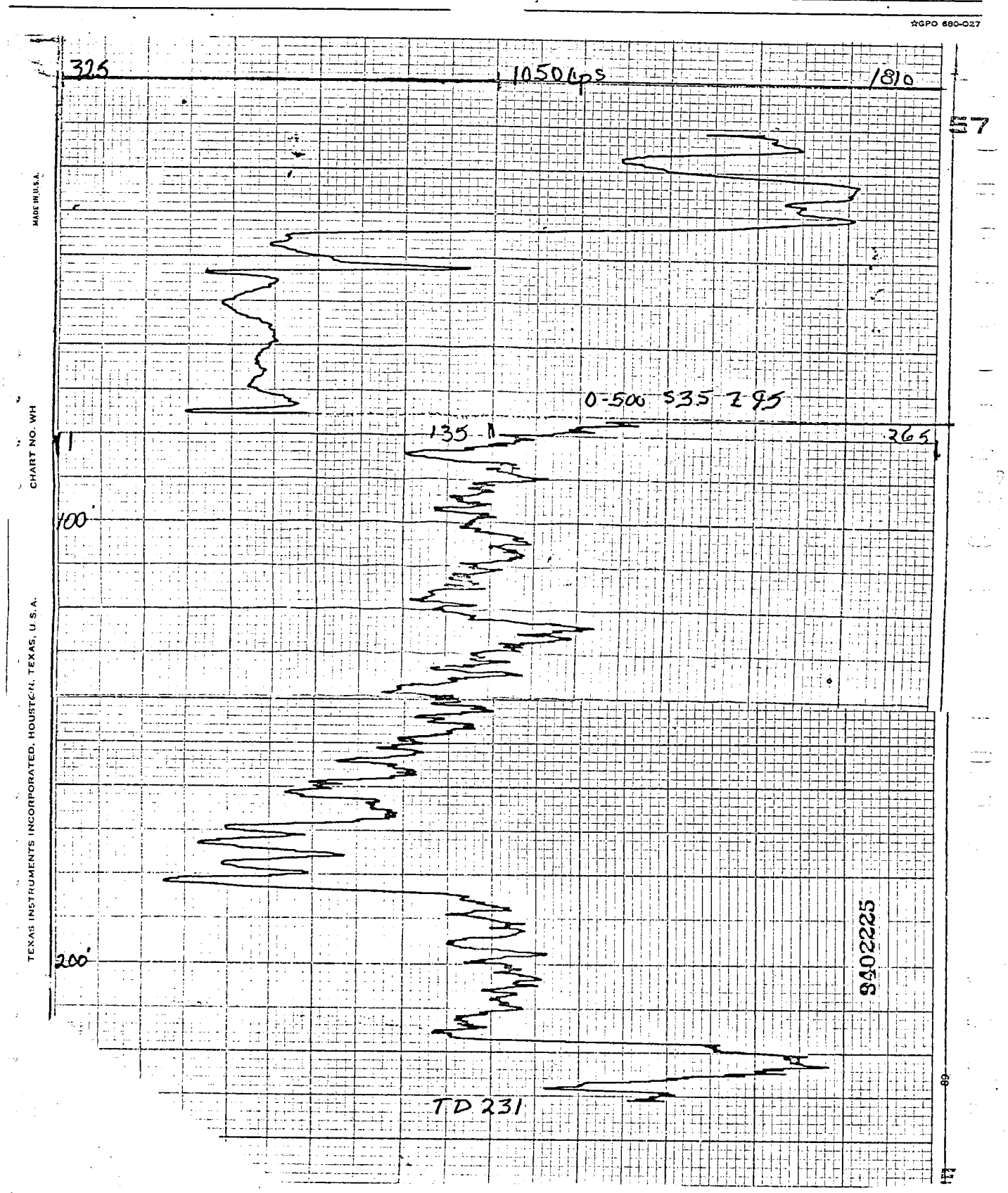
Perf. interval(s) from to , type
Open hole diameter: from to
from to

Fluid level: 76.4 ft/in Above At Below L.S., Top Csg
Fluid type: WTR temp °F, °C
Fluid resist.: ohm-m
Driller:
Address:
Type of rig:
Date started: completed
Aquifer or formation:

NOTE: This log is not to be used to fulfill private contractu obligations.

Other data and logs available for this well:

☆GPO 680-027



# NUCLEAR LOG

TYPE: GAMMA-GAMMA DATE: 9 Oct 79

LOCATION: State MINN County Hennepin Town _____

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIVISION

District or Project: _____

FILE LOCATION NO.: _____

CONFIDENTIAL PURSUANT TO COURT ORDER

DRAFT

## LOGGING INFORMATION

Operator(s) USGS - McCullough
Equipment Address: DFC Denver Colo
Logger type: Well Recon No. Computer
Tool type: do
Detector type: Scintillation
Source type: Cs 137
Source size: _____ C; 325 MC
Source spacing: 10" Spacer
Tool length, cable head to detector 11 ft ____ in
Calibration: Ser log . cps
Logging speed: 17 ft/min up down
Log vert. scale: 20 ft/in

## MODULE SETTINGS

Scale switch (rate or counts): 0-1K cps } chart div (or)
_____ } full scale
(circle as applicable)

T. C. switch: 4 sec.
Position Pot. (Base, zero, or suppression) 965 & 80 Dial Div.
Sensitivity Pot. (Span): 4.0 & 35 Dial Div.
Discrimination Pot.: 858 Dial Div.
Input pulse: 12 volts; Polarity Neg
Output switch: normal; reverse
Actual scale: _____ cps } chart div (or)
_____ API } full scale
(circle as applicable)

## RECORDER SETTINGS

| | Ch 1 | Ch 2 | Ch 3 |
|---|---|---|---|
| Position Pot.: | | | |
| Sensitivity Pot.: | | | |

Run No. _____ of _____

Remarks: _____

## WELL INFORMATION

Well No. (USGS): Well - W122 St Louis Park
Other: _____
Map or Quad _____
Site description _____

Agency or Owner: USGS
Address: _____
Altitude of L.S. _____
Log M.P. Top 4" Csg Log TD 231 ft
Btm log interval: _____ ft Well TD: 240 239 ft
Top log interval: _____ ft
Type of finish: _____
Casing: Elev. of top _____ ft/in Above / Below L.S.

I.D. 4", from -3.6' to 217, type Steel
I.D. _____, from _____ to _____, type _____
I.D. _____, from _____ to _____, type _____

Cement: from _____ to _____

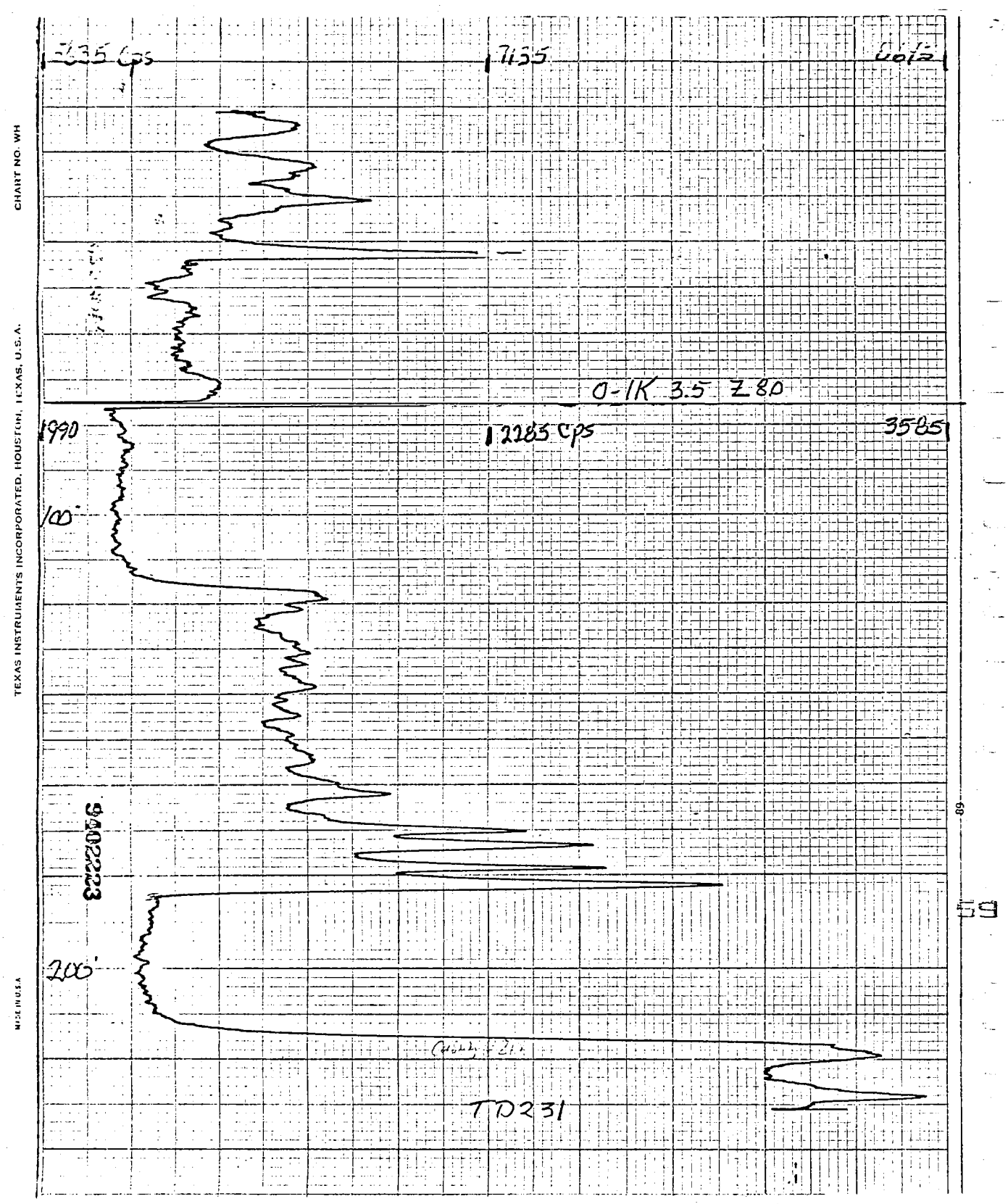
Perf. interval(s) from _____ to _____, type _____
Open hole diameter: _____ from _____ to _____
_____ from _____ to _____

Fluid level: 76.4 ft/in Above / At / Below L.S., Top Csg
Fluid type: WTR temp _____ °F, °C
Fluid resist.: _____ ohm-m
Driller: _____
Address: _____
Type of rig: _____
Date started: _____ completed _____
Aquifer or formation: _____

NOTE: This log is not to be used to fulfill private contractual obligations.

Other data and logs available for this well: _____

☆GPO 680-027



Minnesota Unique Well No.
**434042**

County Hennepin
Quad Minneapolis South
Quad ID 104A

**MINNESOTA DEPARTMENT OF HEALTH**
# WELL AND BORING RECORD
*Minnesota Statutes Chapter 103I*

Entry Date 01/14/2009
Update Date 01/14/2009
Received Date

**Well Name** W-410

| Township | Range | Dir | Section | Subsections | Elevation | ft. |
|---|---|---|---|---|---|---|
| 117 | 21 | W | 17 | | Elevation Method | |

| Well Depth | Depth Completed | Date Well Completed |
|---|---|---|
| 185 ft. | 125 ft. | 09/20/1989 |

**Drilling Method** Multiple methods used

**Well Address**
6425 OXFORD ST
ST LOUIS PARK MN 55416

| Geological Material | Color | Hardness | From | To |
|---|---|---|---|---|
| SAND | BROWN | SOFT | 0 | 15 |
| CLAYEY SAND | BROWN | MEDIUM | 15 | 25 |
| SILTY F. SAND; T. GRAVEL | BROWN | MEDIUM | 25 | 55 |
| MED. GRAVEL; T. SAND | VARIED | HARD | 55 | 78 |
| PLATTEVILLE LIMESTONE | GRAY | V.HARD | 78 | 93 |
| GLENWOOD SHALE | GREEN | MEDIUM | 93 | 98 |
| ST. PETER SANDSTONE | WHITE | SOFT | 98 | 130 |
| ST. PETER SANDSTONE | WHITE | SOFT | 130 | 184 |

**Drilling Fluid** Bentonite

**Well Hydrofractured?** ☐ Yes ☐ No
From Ft. to Ft.

**Use** Monitor well

**Casing Type** Steel (black or low carbon) **Joint** Welded **Drive Shoe?** ☐ Yes ☑ No **Above/Below** 2.25 **ft.**

| Casing Diameter | Weight | Hole Diameter |
|---|---|---|
| 18 in. to 90 ft. | 70.59 lbs./ft. | 18 in. to 90 ft. |
| 12 in. to 95 ft. | 29.56 lbs./ft. | 18 in. to 95 ft. |
| 6 in. to 105 ft. | 18.97 lbs./ft. | 12 in. to 130 ft. |

**Open Hole** from ft. to ft.

**Screen** YES **Make** JOHNSON WIREWOUND **Type**

| Diameter | Slot/Gauze | Length | Set Between |
|---|---|---|---|
| 3 | 40 | 85 | 85 ft. and 94 ft. |

**Static Water Level**
25 ft. from Land surface Date Measured 09/10/1987

**PUMPING LEVEL (below land surface)**
64 ft. after 30 hrs. pumping 80 g.p.m.

**Well Head Completion**
Pitless adapter manufacturer Model
☐ Casing Protection ☑ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

***REMARKS***
THIS WELL WAS DEEPENED & NEW SCREEN INSTALLED 0-20-1989.
ORIGINALLY SCREEN FROM 105-125 FT.

**Grouting Information** Well Grouted? ☑ Yes ☐ No

| | | |
|---|---|---|
| Grout Material: | from to 105 ft. | 2 yrds. |
| Grout Material: | from to 95 ft. | 2.75 yrds. |

**Nearest Known Source of Contamination**
_feet _direction _type

Well disinfected upon completion? ☐ Yes ☑ No

**Pump** ☐ Not Installed Date Installed
Manufacturer's name Model number __ HP _ Volts
Length of drop Pipe _ft. Capacity _g.p.m Type Material

**Abandoned Wells** Does property have any not in use and not sealed well(s)? ☐ Yes ☑ No

**Variance** Was a variance granted from the MDH for this well? ☐ Yes ☐ No

**Well Contractor Certification**

| Bergerson-Caswell | 27058 | GLENN/TONY |
|---|---|---|
| License Business Name | Lic. Or Reg. No. | Name of Driller |

**First Bedrock**
**Last Strat**
**Aquifer**
**Depth to Bedrock ft.**

## County Well Index Online Report

**434042**

Printed 11/7/2012
HE-01205-07